

**National Aeronautics
and Space Administration**

**April 14, 2004
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ANNOUNCEMENT OF OPPORTUNITY

Mars Science Laboratory Investigations

**Notice of Intent due:
Proposals due:**

**May 14, 2004
July 15, 2004**

Mars Science Laboratory Investigations

Announcement of Opportunity
Soliciting Proposals for Basic Research
for Period Ending
July 15, 2004

NNH04ZSS001O
Issued: April 14, 2004

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

MARS SCIENCE LABORATORY INVESTIGATIONS
ANNOUNCEMENT OF OPPORTUNITY
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1.0 Description of Opportunity

1.1 Overview

The National Aeronautics and Space Administration (NASA) Office of Space Science (OSS) is releasing this Mars Exploration Program Announcement of Opportunity (AO) to solicit proposals for Mars Science Laboratory (MSL) space flight science investigations. These investigations will respond to the overall MSL science objective to explore and quantitatively assess a local region on the Mars surface as a potential habitat for life, past or present. This mission will use a variety of instruments carried on a rover platform that will operate under its own power and telemetry and is expected to remain active for one Mars year. Proposals in response to this AO will be due 90 days after its formal release (see Schedule, Section 8.0). For the purpose of this AO, a science investigation includes the construction of the proposed instrument(s), delivery to NASA, mission operation and data collection, calibration, validation, and analysis with delivery of data to the Planetary Data System (PDS).

The solicited MSL investigations include the following Groups of landed, *in situ* investigations:

- 1) analytical laboratory investigations that provide and use instruments or instrument systems to analyze Martian atmosphere (gas) samples and/or regolith, rock, ice samples provided by the MSL Sample Acquisition, Processing, and Handling System;
- 2) remote sensing investigations that provide and use instruments or suites of instruments to be mounted on the MSL Rover Mast;
- 3) contact instrument investigations that provide and use instruments to be mounted on a robotic arm (or arms) to be provided by MSL; and
- 4) investigations that provide and use individual instruments mounted elsewhere on the MSL Rover including a sensor to assess the radiation environment at the local Martian surface. NOTE:
 - a. *An in situ analysis of the hydrogen content of the bulk surface (likely manifested as ice or OH bearing minerals) will be accomplished by an active neutron spectrometer provided to NASA through a cooperative agreement with the Russian Space Agency.*
 - b. *An analysis of the landing site environment will be accomplished by a meteorology station measuring temperature, pressure, wind speed and direction, humidity, UV dose from 200 to 400nm, atmospheric dust, and local fluctuations in magnetic field provided to NASA through a cooperative agreement with the Spain's Ministry of Science and Technology.*

Proposals may be submitted for science investigations that involve a single instrument or a suite of instruments. Individual instruments selected for any group of investigations that are provided by more than one Principal Investigator (PI) may have one of the PIs designated as the suite Team Leader by NASA and given additional integration and

operation responsibilities. NASA reserves the right to add instruments to a selected proposed suite and/or not to select instruments proposed as part of an instrument suite. (see Appendix A, Section II)

Solicitation for investigations by MSL facility instrument scientists, interdisciplinary scientists, and participating scientists is not included in this AO. MSL facility instrument scientists and interdisciplinary scientists may be selected before MSL Project Preliminary Design Review (PDR), while the participating scientist opportunity is expected to bring additional scientists into the mission team near the time of launch. Because these additional investigations will be competed, proposers to this AO should constrain the number of Co-Investigators to only those who have a substantial role in development, as well as operations of the mission.

Given the submission of proposals of merit, NASA intends to select investigations in Groups 1), 2), and 3) and may select investigations for Group 4), if resources permit. Investigations selected in all groups will be funded to begin Phase A/B design activities. Investigations that successfully complete Phase A/B, including a Preliminary Design Review/Confirmation Review, may then be confirmed and funded for Phase C/D, detailed design and development. NASA reserves the right to deselect investigations at PDR/Confirmation even if they have successfully completed Phase A/B should resource limitations present a problem.

MSL emphasizes the use of rover mobility to provide multiple sampling opportunities for the primary (Group 1) analytic laboratory investigations. Investigations in Groups 2) and 3) have dual roles and are expected to be used to locate and select suitable sampling targets, as well as conduct their associated scientific investigations.

1.2 Program Architecture, Goals, and Objectives

In response to the recommendations by its advisory and analysis groups, NASA is currently undertaking a long-term systematic program of Mars scientific exploration, the Mars Exploration Program (MEP). The overarching goal of the program is to answer the question, *“Did life ever exist on Mars?”* The scientific objectives established by the program to address this goal are to search for evidence of past or present life, to characterize the climate and volatile history of Mars, to understand the surface and subsurface geology (including the nature of the interior), and to characterize the Martian environment quantitatively in preparation for human exploration. One common thread that links these objectives is to explore the role of water in all of its states within the “Mars system,” from the top of the atmosphere to the interior.

The MEP is presently implemented as a sustained series of flight missions to Mars, each of which will provide important, focused scientific return. Taking advantage of launch opportunities available approximately every 26 months, the MEP is undertaking a set of missions that will ultimately provide for a discovery-driven set of flight mission options in the next decade, including possible return of samples to Earth, as well as

astrobiological field laboratories. To achieve these goals, the basis for understanding the processes that have formed and modified the Mars environment, along with providing a means to select the best local sites for surface exploration, will be achieved by orbital reconnaissance (i.e., Mars Global Surveyor, Odyssey, and Mars Reconnaissance Orbiter).

General scientific objectives for the exploration of the Solar System have been established by scientific advisory committees, including the Committee on Planetary and Lunar Exploration (COMPLEX) of the Space Studies Board of the National Research Council and the Solar System Exploration Subcommittee of the National Aeronautics and Space Administration (NASA) Space Science Advisory Committee (SScAC). Specific goals at the investigation level for the exploration of Mars and a variety of approaches for achieving them have been established by the Mars Exploration Program Analysis Group (MEPAG).

Management of NASA's Mars program is the responsibility of the Mars Exploration Program located in the Office of Space Science (OSS), NASA Headquarters, Washington, DC. The Mars Science Laboratory project is managed by the Space Science Flight Directorate at the Jet Propulsion Laboratory (JPL), Pasadena, California. It is the JPL MSL Project's responsibility to provide the launch system, spacecraft, landing systems, the Rover and its sample acquisition, processing and handling capabilities, and payload accommodations, as well as mission systems engineering, assurance, and management. The Space Science Flight Directorate is responsible for implementation of the MSL mission and the operation of Mars exploration missions through the OSS JPL Mission Management Office. NASA Headquarters will be responsible for the evaluation and selection process associated with this AO; JPL will award subcontracts for selected investigations under their prime contract. NASA organizations selected for funding under this AO will be funded directly, not through JPL.

The broad goals of the Mars Exploration Program (MEP) and the specifics of where it fits relative to the strategic plan for NASA's Space Science Enterprise in general may be found in *"The Space Science Enterprise 2003 Strategy"* (see Section 3 below for location of MSL Acquisition Program Library). The MEP is fundamentally a science driven program whose focus is on understanding and characterizing Mars as a dynamic "system," and ultimately addressing whether life is or was ever a part of that system. The MEP further embraces the challenges associated with the development of a predictive capability for Martian climate and how the role of water, obliquity variations, and other factors may have influenced the environmental history of Mars. One of the foundation elements of the scientific strategy for the MEP is also referred to as "follow the water." This strategy connects fundamental program goals pertaining to biological potential, climate, the evolution of the solid planet, and the development of knowledge and technologies applicable to the eventual exploration of Mars by humans.

The core MEP addresses the highest priority scientific investigations directly related to the Program goals and objectives. These planned investigations were derived by means of a highly inclusive process involving a large segment of the broad Mars/planetary

exploration community. MSL investigations are a means of addressing other high-priority scientific investigations recommended to NASA by the science community (e.g., NRC Committee for Planetary Exploration (COMPLEX) report of November 2001; and the Mars Exploration Payload Analysis Group (MEPAG) report of October 2003; see the MSL Acquisition Program Library).

The goals and objectives of the MEP are outlined below. MSL investigations are also governed by these overall goals.

Scientific Goals and Objectives of the NASA Mars Exploration Program

- Goal 1. Determine whether life ever arose on Mars:
 - Objective 1 – Determine if life exists today.
 - Objective 2 – Determine if life existed on Mars in the past.
 - Objective 3 – Assess the extent of prebiotic organic chemical evolution on Mars.

- Goal 2. Characterize the Climate of Mars:
 - Objective 1 – Characterize Mars' present climate and climate processes.
 - Objective 2 – Characterize Mars' ancient climate and climate processes.

- Goal 3. Characterize the Evolution of the Surface and Interior of Mars:
 - Objective 1 – Determine the nature and sequence of various geological processes that have created and modified the Martian crust and surface.
 - Objective 2 – Characterize the structure, composition, dynamics, and history of the planet's interior.

- Goal 4. Prepare for human exploration of Mars: *
 - Objective 1 – Acquire appropriate Martian environmental data such as radiation.
 - Objective 2 – Conduct in-situ engineering and science demonstrations.
 - Objective 3 – Emplace infrastructure for future missions.

*Note: Goal 4 is an integrated element of the current MEP and is considered of importance to this AO, particularly for its Objective 1.

2.0 Investigation Science Objectives

The overall science objective of the MSL mission is to explore and quantitatively assess a potential habitat on Mars. Proposals to this AO must be in concert with and responsive to the science objectives of the MSL mission. The following investigations are solicited to meet the overall objective, with A-C representing the science floor of the MSL mission (see April 2003 *PSIG Report* document in MSL Acquisition Library at <http://centauri.larc.nasa.gov/msl/MSLLib.html> for further details):

- A. Assess the biological potential of at least one target environment identified prior to MSL or discovered by MSL.
- B. Characterize the geology of the landing region at all appropriate spatial scales (i.e., ranging from micrometers to meters).
- C. Investigate planetary processes of relevance to past habitability, including the role of water.
- D. Characterize the broad-spectrum of the surface radiation environment, including galactic cosmic radiation, solar proton events, and secondary neutrons.

In addition, proposers are also encouraged to support the following lower priority objective:

- E. Investigate the presence of known toxic materials, such as Cr VI, as part of the basic geochemical surveys of Martian regolith or rocks.

3.0 Background

The MSL mission, for which investigations are being solicited by this AO, will land a rover on Mars using the 2009 launch opportunity. This mission is an integral part of the Mars program and is being planned, designed, and developed for the Mars Exploration Program by the Jet Propulsion Laboratory.

Supporting material to aid prospective proposers can be found in the Proposal Information Package (PIP) and other documents on the MSL Library that is located on the Mars Science Laboratory Acquisition Program website (<http://centauri.larc.nasa.gov/msl>). These materials are subject to revision or change. Thus, proposers are advised to visit the Website regularly to obtain updates that will be announced on the cover page of the Library website. Proposers who file Notices of Intent (NOI) to propose (see Section 6.2) will be notified by E-mail of any such revisions/changes.

Questions regarding clarification of items in the AO, or the MSL Library references including the PIP should be submitted by mail/E-mail to the NASA Program Scientist for the Mars Science Laboratory, Dr. Michael Meyer at the below address.

Dr. Michael Meyer
Ref.: MSL
Solar System Exploration Division
Office of Space Science
Code SE
National Aeronautics and Space Administration
Washington, DC 20546-0001
Facsimile: 202-358-3097
E-mail: michael.a.meyer@nasa.gov

Responses to all inquiries will be answered by E-mail and/or also posted weekly at the Frequently Asked Questions (FAQ) location of the MSL Acquisition Program website until two weeks before the proposal due date. Questions can also be raised at the Preproposal Conference (see Section 6.1 below). Anonymity of persons/institutions who submit questions will be preserved.

4.0 Proposal Opportunity Period

This AO is for a singular opportunity to submit proposals according to the schedule in Section 8.0 below.

5.0 Constraints, Guidelines, and Requirements

5.1 General Constraints and Guidelines

Only those investigations with proposed cost, design/development schedule, infrastructure requirements, and resource requirements that are within the constraints and guidelines identified herein will be considered as candidates for selection.

Much of the responsibility for the selected investigation rests with the investigation team, which will have significant freedom to accomplish its proposed objectives within the stated schedule and financial constraints. This responsibility, however, will nonetheless be exercised with essential NASA/JPL oversight to ensure that it is responsive to the needs and constraints of the MSL mission, the MEP, and the capabilities of NASA's infrastructure for Mars as will be described in the sections below. Once an investigation has been selected for development for flight, failure to maintain reasonable progress on an agreed upon schedule and cost, or failure to operate within the constraints outlined in this section, may be cause for its termination by NASA. Therefore, every aspect of a MSL investigation must reflect a commitment to mission success.

MSL investigations must be headed by a single Principal Investigator (PI) who is responsible to NASA for all aspects of the investigation including instrument design, development, test, and delivery to JPL per the MSL project schedules found in the PIP in the MSL Acquisition Library. This responsibility includes not only the scientific integrity of the investigation, but also the complete investigation (development and operation),

including provision of the experiment hardware, software, ground support equipment, including any necessary simulators, and support of mission operations planning and execution, data analysis, planning and implementation of an appropriate education and public outreach program, and timely archiving of calibrated data into the PDS archive and publication of results. All Co-Investigators (Co-Is) named to an investigation must have a substantial, well-defined role in the investigation.

Participation in this AO will be open to all categories of organizations (foreign and domestic), including educational institutions, industry, not-for-profit organizations, Federally Funded Research and Development Centers (FFRDCs), NASA Centers and other Government agencies. PIs are responsible for and may assemble their investigation teams from any and all of these organizations.

Contributions of any kind to MSL investigations by organizations other than the NASA Office of Space Science (OSS) are welcome. These contributions can be cash or noncash (i.e., property and services). However, for U.S. PI-led investigations the sum of such contributions may not exceed one third of the proposed development cost of the investigation to the OSS. In addition, for investigation suites, no more than one instrument or one third of the instrument suite (whichever is greater) may be contributed. In all cases contributions must be identified by source and amount in the proposal and must have letters of endorsement from all non-Code S organizations (both foreign and domestic participants) offering goods and/or services (including the support of members of the science team) for the proposed investigation. Proposals lacking such letters, or letters judged inadequate by NASA, may be cause for rejection of the proposal without further review. See Section 5.11 of this AO for other guidelines for non-U.S. proposals.

Investigations and investigators proposed by foreign partners are to be provided on a no-exchange-of-funds basis to NASA and will be evaluated the same way as all other proposals for science merit and feasibility, and risk (see Sections 5.11 and 7.1 for additional guidelines).

All proposals will be required to include in their overall planning commitment to NASA's Education and Public Outreach and Small Business programs as discussed in Section 5.3 and Part 3 of Appendix B of this AO.

5.2 Science Requirements

In all proposals, a science investigation must be clearly defined. MSL investigations are intended to complement and potentially amplify the otherwise established NASA MEP and the MSL Science Objectives (see Sections 1.2 and 2.0 above). The relationship between the scientific objectives, the data to be returned, and the instrumentation to be used in obtaining the desired data must be unambiguous and clearly stated. MSL investigation teams will be responsible for initial calibration, validation, and analysis of the data, its subsequent delivery to the NASA Planetary Data System (PDS) in calibrated format (i.e., with adequate documentation), and the timely publication of initial scientific

results. (Note that information on the PDS, its formats, and its requirements is included in the MSL Acquisition Library.)

Proposals to this AO must also include an adequately budgeted data analysis period, independent of PDS archiving activities, as a part of the Phase E activities that is understood to include publication of scientific results of the investigation in refereed journals. Failure to do so shall be reason for declaring a proposal as being non-responsive to this AO and its return without further review.

Following established NASA policy, there shall be no period of exclusivity for data rights for MSL investigations. MSL teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate and calibrate the scientific data prior to delivery to the PDS. Data products delivered to the PDS shall be documented, validated, and calibrated in physical units useable by the scientific community at large. The time required to complete this process and make the data available to the scientific community and the general public should be six months or less. Proposers who offer to deliver suitably calibrated science measurement datasets before this time will be appropriately credited for their plans (see Section 7.1), since this will support a wider-community data analysis activity.

Planetary protection requirements and the scientifically driven desire for organic cleanliness will place constraints on instrument development, integration, and operations. Although the MSL mission specifically excludes investigations for extant Martian life, the spacecraft, Rover, and instruments may still require sterilization and limits will be placed on background organic contamination. The MSL mission will, in particular, be subject to the established protocols that address forward contamination with respect to Mars. Specifically, it should be noted that the MSL mission will be subjected to rigorous cleanliness and bioprotection protocols that may require, among other procedures, dry heat microbial reduction or other treatments, in accordance with NASA planetary protection policy (NASA Policy Directive (NPD) 8020.7F or current revision) and as discussed in the PIP (see MSL Acquisition Library). The MSL JPL project is responsible for the mission meeting the planetary protection requirements. However, it will be the responsibility of the proposer to have a planetary protection plan that would enable their instrument to meet planetary protection requirements.

5.3 Education, Public Outreach, and Small Disadvantaged Business Requirements

5.3.1 Education and Public Outreach Requirements

The National Aeronautics and Space Administration's (NASA) Vision Statement, "To improve life here, to extend life to there, and to find life beyond," and Mission Statement,

- To understand and protect our home planet;
- To explore the Universe and search for life
- To inspire the next generation of explorers
...as only NASA can.

provide the context for the NASA Education program. As part of its response to this mandate, OSS is committed to fostering the broad involvement of the space science research community in Education and Public Outreach (E/PO) with the goal of enhancing the nation's formal education system and contributing to the broad public understanding of science, mathematics, and technology. Progress towards achieving this goal has become an important part of the broad justification for the public support of space science. In addition, an enhanced, coordinated Agency-level education program is now being undertaken through the new NASA Office of Education that constitutes the Agency's sixth enterprise. NASA's Education objectives and the OSS areas of emphasis in E/PO directed towards meeting those objectives are given in table below.

In accordance with established OSS policies, E/PO is an integral element of any space science project and 1 to 2 percent of the NASA OSS Cost (excluding launch vehicles) will be allocated to E/PO. Every proposal to this AO must contain an E/PO component following the guidelines contained in Section 2.6 of Appendix B.

OSS strongly encourages space science researchers to engage actively in education and public outreach as an important component of their NASA-supported professional activities. The key documents that establish the basic policies and guidance for all OSS E/PO activities are *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), *Implementing the Office of Space Science Education/Public Outreach Strategy* (October 1996), and the *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (March 2004). Additional information concerning NASA Education and Public Outreach may be found in the NASA Education Enterprise Strategy (October 2003) at http://www.education.nasa.gov/pdf/55377main_32915-Education_508.pdf and the Space Science Enterprise Strategy (October 2003) at <http://spacescience.nasa.gov/admin/pubs/index.htm>. These documents are available through the MSL Library or, alternatively, may be accessed electronically by selecting "Education" from the menu on the OSS homepage at the World Wide Web address <http://spacescience.nasa.gov/>, or may be obtained in hard copy from Dr. Philip J. Sakimoto, Office of Space Science, Code S, NASA Headquarters, Washington DC 20546; (E-mail: philip.j.sakimoto@nasa.gov).

Instructions for the E/PO component of the proposal are contained in Appendix B and Appendix C. Also note that significant elements of this AO's goal for involvement of minority institutions (see Section 5.3.2) may be met through an appropriately planned E/PO program.

Additionally, the MEP has a program level Public Engagement Plan (see the MSL Library). Proposers to this AO will be required to coordinate their E/PO activities with and complement this overarching Mars Public Engagement Plan. A detailed E/PO implementation plan will be developed by each selected investigation and delivered in conjunction with its Phase A/B activities. As outlined in Section 7.4, the proposed plans for E/PO may be used to discriminate among proposals that are otherwise equal in the final selection process.

Questions and/or comments and suggestions about the OSS E/PO program are welcome and may be directed to Dr. Larry P. Cooper, (telephone: (202) 358-1531; E-mail: larry.p.cooper@nasa.gov.)

***NASA EDUCATION AND PUBLIC OUTREACH
STRATEGIC GOALS, OBJECTIVES, AND FOCUS AREAS***

NASA Mission Statement: To Inspire the Next Generation of Explorers

NASA Strategic Goal 6: Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics.

NASA Objectives	OSS Areas of Emphasis
1. Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities.	a) Provide opportunities for students to work directly with NASA space science missions, facilities, and data. b) Take advantage of the advanced-technology nature of the space Science Enterprise's programs to develop new materials and new programs in technology education

2. Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.	Continue to contribute to the professional training of scientists by supporting research assistantships and postdoctoral opportunities offered through Space Science Enterprise research awards and through other NASA research and higher education programs.
3. Increase the number and diversity of students, teachers, faculty, and researchers from underrepresented and underserved communities in NASA-related science, engineering, mathematics, and technology (STEM) fields.	<p>Increase opportunities of diverse populations to participate in space science missions, research, and education and outreach programs:</p> <p>a) Continue and expand our efforts to develop space science capabilities at minority institutions.</p> <p>b) Develop and enhance partnerships with special interest organizations such as professional societies of minority scientists.</p> <p>c) Develop working partnerships and coordinate with the diversity initiatives of scientific professional societies.</p> <p>d) Extend the accessibility of space science E/PO programs and products to an increasingly broad population, including girls, residents of rural areas, and persons with disabilities.</p>
4. Increase student, teacher, and public access to NASA education resources via the establishment of e-Education as a principal learning support system.	Improve the coherence of NASA Space Science materials for educators by building a framework that will show the appropriate standards-aligned sequencing of space science topics throughout the K–12 years for the materials being produced by individual missions.

NASA Strategic Goal 7: Engage the public in shaping and sharing the experience of exploration and discovery.

NASA Objectives	OSS Areas of Emphasis
<p>1. Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.</p> <p>a) Improve science literacy by engaging the public in NASA missions and discoveries, and their benefits, through such avenues as</p>	<p>a) Build on strong mutual interests between the Space Science Enterprise and the science center, museum, and planetarium communities by continuing to provide space science content, materials, and technical expertise to support the development of exhibitions and programs.</p> <p>b) Seek out and capitalize on special events and particularly promising opportunities in our scientific program to involve the public in the process of scientific discovery and to use space</p>

public programming, community outreach, mass media, and the Internet.	science to improve STEM education at all levels. c) Enrich the science, mathematics, engineering, and technology education efforts of community groups such as the Girl Scouts, 4-H Clubs, and Boys and Girls Clubs through the introduction of space science.
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5.3.2 Small Business

Offerors other than small business concerns are advised that contracts resulting from this AO will be required to contain a subcontracting plan that includes goals for subcontracting with small, small disadvantaged, women-owned, and Historically Underutilized Business Zone, veteran-owned, and service-disabled veteran-owned small business concerns (see Section XIII of Appendix A). Investment in these organizations reflects NASA's commitment to increase the participation of minority concerns in the aerospace community and is viewed as an investment in the nation's future. Proposers to this AO are expected to use their best efforts to assist NASA in achieving its goal for the participation of all forms of small business in NASA procurements. Note that substantial involvement of minority colleges and universities in space science missions and research programs is also a key objective of the OSS E/PO program.

While only a preliminary subcontracting plan is required at the time the proposal to this AO is written, a detailed implementation plan will be developed by each selected investigation and delivered in conjunction with its Phase A/B contract as directed by the MSL project office. Participation goals and the quality and level of work performed by small disadvantaged businesses and minority institutions will be examined in the confirmation review of investigations for development for flight.

5.4 Mission Overview

The MSL Rover will be launched from the NASA Kennedy Space Center Eastern Test Range, on an intermediate-class (e.g., Delta IV or Atlas V) launch vehicle, with a 20-day launch period, opening as early as October 2009 and closing in November 2009. Payload science instruments will be in a power-off state during the launch and injection phase. The cruise phase begins when the spacecraft separates from the launch vehicle and ends prior to Mars entry, descent, and landing (EDL). The cruise phase lasts approximately 10 to 14 months, depending on the launch date, trajectory, and landing site selection. The Rover will remain enclosed inside an aeroshell during the entire cruise. The landing date ranges from May 2010 to not later than December 2010.

The EDL phase begins when the vehicle reaches Mars altitude of approximately 125 km, and ends with a soft touchdown of the Rover on the Martian surface followed by the flyaway of the "sky-crane" descent stage. Payload science instruments will be in a power-off state during EDL.

After landing, the primary landed mission operations will commence and last for approximately one Martian year, 670 sols (687 Earth days). The landed mission begins with the critical Rover deployments, Rover health checks, and establishment of communications with Earth. Critical deployments include the high gain antenna (HGA), remote sensing mast (RSM), and release of launch lock constraints on the robotic arms. After the RSM has been deployed, the Rover will image the landing site. These data, along with Rover health telemetry, will have priority data return during the initial checkout period. Science instrument health checks will be included in the subsequent early surface ops activities. Normal surface operations can be divided into several representative Sol Template types:

- 1) Traverse and Approach.
- 2) Site Reconnaissance (Remote Sensing).
- 3) Sample Acquisition / Sample Processing and Handling and Contact/*in situ* Instrument Data collect.
- 4) Analytical Laboratory and Contact Science
- 5) Recharge / Telecom.

The five Sol Templates are discussed in detail in Section 4.4.1 of the PIP.

At the end of the primary mission, an extended mission may continue until the end of the Rover's useful life or the end of operations funding, whichever comes first.

Certain constraints are mandated by NASA's commitment to cost efficiency in the MSL mission. The cost constrained nature of the mission requires that the payload development and scientific mission be accomplished within allocated costs. In addition, the payload will be allocated available resources for mass, energy, volume, data rate, duty cycle, and other key resources as specified in the PIP. Therefore, proposed instruments must demonstrate adequate reserves and margins consistent with contemporary design principles and engineering practices.

The PIP contains preliminary descriptions of the 2009 Mission, Rover, the environments in which the instruments are expected to survive and operate, Principal Investigator (PI) responsibilities and deliverables, and the capabilities of the MSL ground system and mission operations, as well as details of funding allocations and profiles. In case of a conflict between this AO and the PIP, the AO takes precedence.

Radioisotope Power Sources (RPS) are being considered for use as the primary Rover power source on the MSL mission. The final decision on this implementation will not occur until Phase B for the flight system. Thus, chosen investigations must meet design requirements that allow for the radiation environments and extended lifetime afforded by this option. Preliminary radiation environmental requirements information can be found in Section 3.7.2 of the PIP in the MSL Acquisition Library.

5.5 Payload Resource and Accommodation Constraints

For all instruments proposed in response to this AO, innovative design approaches that incorporate technological advances in low cost, lightweight, high performance instruments are encouraged. The most tightly controlled resources to MSL Payload elements will be available funds and mass, with volume being significantly constrained for specific instrument placement locations (e.g., arm and RSM mounted instrument hardware). Other accommodation resources will be allocated and managed as well, but are largely dependent on the operational scenarios and duty cycles required to perform the various investigations. Interested proposers are encouraged to read and understand the PIP thoroughly to better plan for all payload accommodation and resource limitations and constraints.

The current best estimate of the total mass allocation for the investigations solicited by this AO is 48 kg including mass reserves as recommended by the proposers. Although selection will be made against this total mass allocation, the PIP (see MSL Acquisition Library) includes further details as to carrying capacity of the various anticipated instrument locations that will also be taken into account. Mass and requirements for reserve are discussed in the PIP in Section 3.2.5.1.

The current best estimates of the total Payload volume allocations for the various anticipated instrument locations are discussed in Section 3.2.5.2 of the PIP.

The current best estimate of total power/energy allocations for the investigations are based on a strawman mission scenario and representative Sol Templates. Allocations are described in the PIP. While MSL power will primarily be allocated based on per sol energy consumption limits and the strawman mission scenario, peak power will also be limited by the system's power switching capabilities. Power and energy allocation is further discussed in Section 3.2.5.3 of the PIP.

Approximately 1 Gbyte of on-board memory will be allocated for storage of instrument data prior to downlink. Total data return capability will be limited (and variable) by the actual downlink opportunities and will likely range from ~100 to >1000 Mbits per sol. A modest data volume (~ 40 Mbits/sol) will always be accommodated for low-latency (same-sol) data return from Payload to enable critical operations planning cycles. Data volume allocations and constraints are further discussed in Section 3.2.5.4 of the PIP.

5.6 Investigation Phases and Schedule Constraints

For investigations selected for MSL, the following phases are defined (also see Section 7.2 of the PIP in MSL Acquisition Library):

Formulation Phase

Phase A: Investigation Definition

Duration: 4 months, starting from time of Selection

(target: November 2004 – March 2005)
Phase ends at Payload Accommodation Optimization with all requirements locked in.

Phase B: Investigation Preliminary Design
Duration: 8 months, from End of Phase A
(target: March 2005 – October 2005)
[Phase ends with Instrument Preliminary Design Review and Confirmation Review]

Implementation Phase

Phase C/D: Investigation Detailed Design, Build, Test, and Integration
Duration: From End of Phase B through Launch plus 30 days
(target: November 2005 – November 2009)

Phase E: Investigation Operations and Data Analysis
Duration: Launch plus 30 days to end of Primary Science Phase
(target: December 2009 – May 2012)

In order to meet the launch window in October 2009, adherence to the following nominal program schedule is anticipated:

Phase A Payload Optimization Complete	March 2005
Instrument PDR and Confirmation Review for Phase C/D	October 2005
Project Preliminary Design Review (PDR)	May 2006
Instrument Critical Design Review (CDR)	October 2006
Project Critical Design Review	March 2007
Delivery of Instrument Engineering Model hardware to JPL	March/June 2007
Delivery of Instrument flight hardware to JPL	May/June 2008
Mission launch	November 2009

5.7 Cost Constraints

It is the intent of NASA to select a combined payload that best satisfies the MSL science requirements within the most favorable combination of payload mass and combined instrument cost. Presently, the MSL Project is budgeting guidelines of \$85M RY for the development of the instrument payload (Groups 1-4). These guidelines include all investigation reserves and cover all phases of development activity through Launch plus 30 days. In addition, \$50M has been budgeted for the MSL operations and data analysis phase (one Martian year baseline plus six months nominal data analysis, validation and archive close out period) including reserves. Note that the MSL project's current plan for cost reserve management (see Section 10.1 of the PIP in MSL Acquisition Library) requires commitment of any proposed cost reserves be reviewed and approved by a process led by the MSL Payload Manager and involving the PI and the Project Scientist as appropriate.

Furthermore, the MSL funding profile is constrained during the first part of the MSL development, with the bulk of funding to come after FY 2005 (see Appendix D of this AO for investigations planning budget profile), which should be reflected in the funding profiles for each proposal. For the Phase A/B period (running from start of contract until successful preliminary design review/confirmation of the investigation; see Section 5.6), the funds available for the instrument development are constrained. The total available funding for the Phase A/B period (including reserve) are expected to be no more than \$10M RY (estimating 70-85% for Group 1, 10-20% for Group 2, and 5-10% for Group 3; selections of Group 4 instrument investigations would be funded by slightly decreasing the proportions of other selected Groups.) These limits include all financial obligations, including any contracts for long lead items needing to be placed during this Phase A/B period. Investigations that successfully complete Phase A/B may be confirmed (at a Preliminary Design Review /Confirmation Review) and will then be funded ~ \$75M RY for Phase C/D, distributed among Groups 1-4 investigations as above.

Finally, note that 1 to 2 percent of the MSL total run-out cost for each selected instrument investigation (see Section 5.3.1) is to be reserved for E/PO activities. It is expected that the bulk of these activities and their funding will come in the operational phase (Phase E) of the MSL mission.

Cost realism and overall cost effectiveness are important criteria in the selection of the Principal Investigator Instruments. Therefore, a realistic schedule and budget for development are required, including the identification and proposed development of long-lead items. Investigators must recommend reserves for funding within the overall allocation based on the maturity of the proposed design and the technologies incorporated in the design approach. The reserves will be evaluated and the findings factored into the best value assessment. Investigators should define descope options in their proposals (if any are practical), decision dates for implementation, costs avoided, and science impact associated with each descope option.

Due to the cost constrained nature of MSL, proposed life cycle costs for any investigation may not increase during Phase A/B by more than 15 percent without being subject to cancellation.

5.8 Science Operations Requirements

It is expected that each PI of an instrument investigation selected through this AO will develop and maintain a science operations facility at their own institution. This facility should provide for instrument command generation and transmission to the MSL Project at JPL, be able to retrieve essential instrument telemetry data for instrument performance assessment and health and welfare assessment, retrieve instrument science data, allow remote participation in the operations science decision process, and provide a means for validating science data and preparing science data for archiving. The PI science operations facility and network configuration must meet Project-specified security

requirements. The plans and budget for the design and staffing of these individual PI science operations facilities must be provided in the proposals.

As discussed in PIP Section 7.4.2.5, the MSL Project will specify a Science Operations and Planning Computer (SOPC) environment and provide operations compatible software, connections to an acceptable network, and software maintenance. Implementation of science operations facilities and capability in time to support spacecraft/instrument testing and operations will be monitored by the MSL Project by means of schedules, peer reviews, formal reviews, meetings, documentation, and configuration control.

5.9 Data Policies and Validation Requirements

The MSL Project requires that raw data, calibration records, and processed data be maintained in an updated form throughout the period of investigation. Specifically, each selected Instrument PI must plan:

- To maintain a continually updated record of the "best version" of the data until meaningful changes in data calibration no longer occur;
- To release data in an appropriate manner for public access as soon as feasible;
- To make appropriate data records available to other investigators and project and personnel during the mission for shared analysis; and
- To support the timely processing and distribution of data, including their deposition in the Planetary Data System (PDS) as soon as feasible but no later than six months after data acquisition.

It is NASA policy that PIs do not have exclusive use of data taken during the course of their investigation (see Section XII of Appendix A). All data from MSL investigations will be nonproprietary and must be made available to the science community and public as soon as possible. In order to engage the public more fully, investigators are strongly encouraged to release subsets of particularly interesting initial data on a daily to weekly basis (plans for, and actual release of, data for public engagement will be coordinated through the MSL Project Science Group). Therefore, as part of a proposer's data release plan, discussion of the volume and timing of data for early release must be addressed, and the necessary preparations costed accordingly. NASA, through the MSL Project, reserves the right to direct or conduct processing and release of data needed for mission or program planning and also to support public engagement.

PIs selected for instrument investigations must plan to archive their Data Products in the Planetary Data System (PDS) in a PDS-compatible data format. Plans must conform to policy and requirements for the validation and archiving of data presented in the document, *"Mars Exploration Program Data Management Plan"* (see MSL Acquisition

Library). After a short period for verification and validation, not to exceed six months, the PI must deposit the validated data in the PDS; analysis, preparation, distribution and archiving of all instrument team data products are to be completed within six months of data acquisition. Exceptions to this guideline are to be identified and appropriate justification given. Data Products will be archived in the PDS as soon as they are available, on a time scale commensurate with the level of data processing to be identified in the jointly developed Science Data Management and Archive Plan. Image data may be made available publicly shortly after reception on the ground.

Initial data analyses for the investigations solicited here will be accomplished by the PIs and their teams. Therefore, proposers are expected to include, as part of their proposed Mission Operations and Data Analysis activities, a clear definition of the roles of all the science team members and a data analysis plan that is consistent with PDS archiving activities. Cost estimates for PI Investigation Instrument team activities will cover all phases, including Mission Operations and Data Analysis.

In addition, because of the requirement for deposition of data in the PDS, all PI Instrument Investigation proposals in response to this AO must specifically include the costs of calibration, verification, and preparation of data for transfer to the archive.

Level 0 (raw data) will be archived by the MSL Project.

5.10 Technical and Management Requirements

5.10.1 Technical Requirements

A proposal in response to this AO must address all technical aspects of its investigation from the beginning of funding through delivery of the data for archiving, the publication of results in the peer-reviewed literature, and the conduct of an appropriate E/PO program. The document, NPG 7120.5B, *NASA Program and Project Management Processes and Requirements*, describes the activities, milestones, and products typically associated with Formulation and Implementation of projects and may be used as a reference in defining a team's mission approach (available through the MSL Acquisition Library). Proposers are encouraged to propose innovative processes, techniques, and activities to accomplish these objectives and to demonstrate cost, schedule, and technical efficiencies.

Each MSL investigation shall have a cost-effective mission assurance program that is consistent with the PIP and PIP-related documents. Mission specific requirements for mission assurance in particular are included in Section 8 of the PIP.

Radioisotope Power Supplies (RPSs) are being considered for use as the primary Rover power source on the Mars Science Laboratory mission. The final decision on this implementation will not occur until phase B for the Flight System. Thus, investigations chosen must meet design and verification requirements that allow for the radiation

environments and extended lifetime afforded by this option. Environmental requirements information is available in the MSL Acquisition Library. Investigations that plan to fly small quantities of nuclear material for heating, calibration, or other reasons must make such intentions clearly defined.

As part of the accommodation and integration of an instrument on the MSL spacecraft, the Project will provide suitably designed mounting brackets and or platforms as defined in the PIP. However, the cost and development of any instrument-unique deployable masts and other mechanisms required by an instrument will be the responsibility of the proposer. The proposer must also ensure that any such masts or mechanisms do not interfere with the operation of the vehicle.

The proposer is responsible for the scientific success of his/her investigation. The proposal must describe the technical approach for every element of the investigation to ensure that the investigation does not exceed the bounds of the available spacecraft or financial resources. Investigators must recommend reserves for mass, power, and other technical resources based on the maturity of the proposed design and the technologies incorporated in the design approach. The proposal must demonstrate that any proposed hardware will operate reliably, must clearly spell out the roles of all Co-Is, and must show that the resulting data can be interpreted in a way to achieve the investigation's stated objectives.

5.10.2 Management Requirements

With appropriate NASA/JPL oversight, NASA intends to give the proposer and his/her team the ability to use their own management processes, procedures, and methods to the fullest extent possible. Therefore, each proposing PI Instrument investigation team is encouraged to define the management approach best suited for their particular investigation and teaming arrangement. This approach should be commensurate with the investigation's implementation approach, while retaining a simple and effective management structure that ensures adequate control of the investigations' design and development within the cost and schedule constraints. The proposal must contain a Work Breakdown Structure (WBS) that best fits its organizational approach and the overall mission design. Section 7 of the PIP provides guidance on Project imposed requirements for reviews, deliverables, and other Science and Payload Management related items.

5.11 Guidelines Applicable to Non-U.S. (Foreign) Proposals and Proposals Including Non-U.S. Participation.

NASA welcomes proposals having participants from non-U.S. institutions provided that they are offered on a no-exchange-of-funds basis and also comply with current U.S. restrictions concerning the export of technology. In addition to meeting the requirements discussed elsewhere in this AO, including the Appendices, which apply to all proposers, foreign proposals and proposals including foreign participation must comply with the policies below.

Note that any proposed international participation in the MSL mission must be described as the same level of detail as that of a U.S. proposed investigation, to the maximum extent possible. NASA will seek to validate contribution costs, schedule, and management data during evaluation of the proposals and in subsequent reviews. Failure to provide such information about proposed contributions, or failure to document the commitment of all team partners to those costs and schedules, may cause a proposal to be found unacceptable for selection through this AO.

5.11.1 General Policies

(1) Although NASA welcomes proposals from outside the U.S., foreign entities are generally not eligible for funding from NASA. Thus, such investigations and investigators must be proposed on a no-exchange-of-funds basis to NASA. In addition, proposals from foreign entities, and proposals from U.S. entities that include foreign participation, must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and, if the proposal is selected, sufficient funds will be made available by the respective foreign government agency or funding/sponsoring institution to undertake the activity as proposed. These Letters of Endorsement are required from all organizations sponsoring non-U.S. participants and must be received at the address given in Section 6.6 by the schedule given in Section 8.0. Also see Appendix B, Section 2.7, item 4.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the AO. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received by the established closing date for proposals. Those received after the closing date will be treated in accordance with Appendix A, Section VII.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the foreign sponsor will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

- (i) An exchange of letters between NASA and the foreign sponsor; or
- (ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

5.11.2 Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation

(1) Foreign proposals and proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 Code of Federal Regulations (CFR) Parts 120-130; 15 CFR Parts 730-774; and 10 CFR 110 and 810, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not be limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or, if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at <http://www.pmdtc.org> and at <http://www.bis.doc.gov>. Proposers are advised that, under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

6.0 PROPOSAL SUBMISSION INFORMATION

6.1 Preproposal Conference

In order to provide the community of interested proposers with the latest and best information about this MSL mission, as well as to answer questions about this AO, NASA will host a Preproposal Conference to be held in the Washington, DC, area approximately two weeks after AO release. Details regarding this conference will be provided on the MSL Acquisition Website. Note that all expenses and arrangements for attending this meeting are the responsibility of the attendee, and NASA funds may not be used to defray any of the associated costs. Questions may be submitted in advance in writing or by E-mail to the MSL Program Scientist identified in Section 3.0 of this AO. Every effort will be made to answer all questions submitted at least one week in advance of the Conference at the meeting. Questions submitted at the Conference itself will be answered to the extent possible; those not answered at that time, as well as the answers to all questions at the Conference including those submitted in advance, will be posted on the Web site of this AO within two weeks of the Conference. In all cases the anonymity of the authors of questions will be preserved.

6.2 Notice of Intent to Propose

A Notice of Intent (NOI) signifying the writer's intent to submit a proposal in response to this AO is requested to be submitted by all proposers via the World Wide Web site <http://research.hq.nasa.gov> by the schedule noted in Section 8 below. Proposers without access to the Web or who experience difficulty in using this site are directed to the NPRS

Help Desk at <http://proposals.hq.nasa.gov/help.html>; e-mail: proposals@hq.nasa.gov; Phone: (202) 479-9376 (Monday to Friday 8AM-6PM EST/EDT)

To the extent the following information is known by the NOI due date, the Website for NOIs will request the following information:

- Name, address, telephone number, fax number, E-mail address, and institutional affiliation of the PI.
- Full names and institutional affiliations of any Co-Investigators (Co-Is). ALL Co-Is must have substantial and well-defined roles in the investigation. If any Co-Is or other team members are from non-U.S. institutions, the organization that will provide support for these people should be identified in the Comments box on the form.
- A brief statement (150 words or less) that includes all of the following:
 - The scientific objectives of the proposed investigation;
 - Identification of new technologies that may be proposed as part of the investigation; and
 - The Education/Public Outreach objectives of the proposed investigation.
- The name of the Lead Representative from each partner organization (industrial, academic, nonprofit, and/or Federal) included in the proposing team.

Note that all information provided in an NOI is for NASA planning purposes only, is confidential, and is replaced by information in the final proposal.

6.3 Format of Proposals

Appendix B provides detailed information concerning the contents and format of proposals submitted in response to this AO.

6.4 Signature Authorizations

All proposals must be signed by an institutional official authorized to certify institutional support and sponsorship of the investigation, as well as of the management and financial parts of the proposal. This is accomplished through the authorizing institutional signature on the Cover Page (see Section 2.1 and 2.7 in Appendix B).

6.5 Required Certifications

All proposals requesting NASA funding must demonstrate compliance with the policies set forth in the certifications and assurances supplied in Appendix E. Note that this information is only for reference; the authorizing institutional signature on the Cover Page form (see Section 2.1 in Appendix B) certifies that the submitting institution has read and is in compliance with these policies.

6.6 Submission of Proposals

The signed original plus 50 copies of instrument proposals must be received at the following address by the schedule in Section 8.0 below:

Mars Science Laboratory
Office of Space Science
NASA Peer Review Services
Suite 200
500 E Street, SW
Washington, DC 20024-2760
Tel: 202-479-9030

In addition to the paper copies, one searchable PDF-formatted Compact Disc-Read Only Memory (CD-ROM) per paper copy must be provided. NASA's policy concerning late delivery of proposals is given in Appendix A, Section VII.

7.0 PROPOSAL EVALUATION, CATEGORIZATION, SELECTION, AND IMPLEMENTATION

7.1 Evaluation Criteria

The fundamental aim of the NASA investigation acquisition process is to identify scientific ideas that are tested and verified by unique instrumental and/or analytical capabilities that best suit the defined scientific objectives, and the technical, management, and cost constraints of the program as described in the AO. The following criteria will be used in evaluating all proposals submitted in response to this AO.

Scientific Merit (Weight 40%): The scientific merit of the proposed investigation will be judged by its impact and relevance to the overall MSL science objective. Impact is determined by whether the proposed investigation fills knowledge gaps, provides fundamental progress in our knowledge of Mars, provides ancillary benefit for space science, and/or supports or overlaps with ongoing Mars investigations. Relevance will be judged on the relation of the proposed investigation to the primary science objectives (A-C) and to the secondary objectives (D-E) of the MSL mission as given in Section 2 above, and the approved goals of the MEP.

Science Feasibility (Weight 30%): Scientific Feasibility will be judged by the adequacy and resiliency of the proposed investigation with particular regard to its instrumentation's feasibility to supply the data needed for the proposed investigation within mission constraints.

In particular the proposed investigation must provide for a clear and logical flowdown from stated objectives to requirements for observations to measurements to the data collected. In addition, the competency and roles of the science team

including any proposed Co-Is to conduct the proposed investigation to a successful conclusion will be assessed, as will the adequacy of plans for data analysis, archiving, distribution, and publication to provide timely access to the investigation's data and findings.

Implementation Risk (Weight 30%): The soundness of the technical and management implementation approach, schedule, and cost realism and reasonableness will be the primary factors considered in determining the Implementation Risk. Each investigation will be evaluated to assess the likelihood that they can be implemented as proposed, including an assessment of the risk of their completion within the proposed costs. Specifically, the following will be evaluated: The technical approach to design, develop, integrate, and test the proposed instrumentation hardware and software to meet the investigation requirements within the mission's constraints defined in the AO and PIP; the adequacy and robustness of the proposed resources (technical, management, and cost); the competence and relevant experience of the proposed technical and management team; and the soundness of plans and commitments to ensure that the investigation can be successfully completed and delivered within budget and meet the project schedule milestones. The proposal must also demonstrate the capability and plan to adhere to sound business practices. Cost realism and cost reasonableness will be used to determine an overall cost risk (uncertainty) associated with the investigation.

7.2 Evaluation Procedures

Proposals received in response to this AO will be evaluated in accordance with the provisions of NASA Federal Acquisition Regulations (FAR) Supplement Part 1872, "*Acquisition of Investigations*," that may be accessed through the Internet host <http://www.hq.nasa.gov/office/procurement/regs/1872.htm>.

All proposals will be subjected to a preliminary screening to determine their suitability and responsiveness to the AO. In particular, the factors shown in Appendix G will be screened for compliance. Proposals that are not in compliance with the constraints, requirements, and guidelines of this AO will be handled as technical correspondence and returned to the proposer without further review.

Following these preliminary actions, the scientific, technical, management, and cost aspects of each proposal will be assessed by panels composed of reviewers who are scientific and technical peers of the proposers. The purpose of this peer evaluation will be to determine the scientific merit and scientific feasibility, and to judge the risk of implementation of each proposal. Findings will be expressed in terms of its major and minor strengths and weaknesses.

All proposals in which the Phase A/B costs are expected to exceed \$500,000 and the proposers are organizations other than small business concerns need to submit a Small Business Contracting Plan (see Appendix A, sec. XIII). The subcontracting plan will be

evaluated on the participation goals and quality and level of work performed by small business concerns, HBCUs, and other minority educational institutions. The review will be conducted as part of the panel review of management.

The Educational/Public Outreach planning for selectable proposals will be appraised by a panel of personnel having professional credentials in those fields, as well as scientists who have demonstrated experience in these activities. The results of this appraisal will be debriefed to selected proposal teams only in order to allow the selected teams to better prepare for Phase A/B activities (see Section 7.4 below).

7.3 Categorization Process

After all scientific, technical, management, and cost evaluations are completed based on the criteria given in Section 7.1 above, an *ad hoc* Categorization Subcommittee of the Space Science Steering Committee (SScSC; see further below in Section 7.4), consisting of U.S. Civil Servants, will meet to categorize the submitted proposals according to the definitions in NASA FAR Supplement 1872.403, as follows:

Category I: Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that the data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Category II: Well conceived and scientifically and technically sound investigations, which are recommended for acceptance, but at a lower priority than Category I.

Category III: Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.

Category IV: Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

Note that all scientific, technical, management, and cost evaluations are the basis of the proposal's categorization. Also, considering the unique nature of this MSL mission opportunity, the selection for funding of any Category III investigations is not anticipated.

At any time during the evaluation process, NASA reserves the right to invite the PIs of proposals to answer questions of clarification about their proposals, including plans for E/PO activities. If such an activity is planned, the request to participate, as well as all

questions to be answered, will be submitted in writing to the proposers. The response to the questions will be returned by mail. This exercise will be only for NASA to clarify perceived uncertainties in understanding or interpretation of the material in the proposals and will not be an opportunity for the proposer to revise or otherwise augment a submitted proposal.

7.4 Selection Process

In parallel with and external to the above process, the MSL Project Office will conduct accommodation assessments for each of the Category I and II individual investigations, and, at the direction of the MSL Program Scientist, also conduct accommodation analyses of a number of combinations of Category I and II investigations in order to establish the impact/penalty for selecting any/all possible selection options of Category I/II investigations. Following the evaluations described above, the MSL Program Scientist at NASA Headquarters, in coordination with Mars Exploration Program of the Office of Space Science at NASA Headquarters, will develop recommendations for selection for Category I and II proposals. These recommendations and all peer review and categorization materials for all proposals will be presented to the Space Science Steering Committee (SscSC), composed of Civil Service personnel appointed by the Associate Administrator for Space Science, for an independent review of the evaluation and categorization processes and records. After successfully completing this review, the final evaluation results, including the accommodation assessment results, all other programmatic considerations including budget, schedule, and the commitment and plans for the E/PO and Small and Small Disadvantaged Business and Minority Institution participation will be forwarded to the Associate Administrator, who will make the selection(s). The selection will also take into account the total cost and cost profile of each candidate investigation. The merit of plans and commitment for E/PO activities, and Small Business Plans that reflect a commitment to involve small businesses of all types in the proposed investigation will be used to discriminate among proposals that are otherwise equal in the final selection process. Proposers are also advised that the selection process may also take into account programmatic and/or budgetary circumstances that may arise after this AO is issued.

Proposers are advised that, in accordance with Section II of Appendix A, NASA may desire to select only a portion of the proposer's investigation and/or may also desire the proposer's participation with other investigators in a joint investigation. In such a case, the proposer(s) will be given the opportunity to accept or decline the offer. Declination of such an offer may lead to nonselection for this flight opportunity.

Selected PI Instrument investigations will be funded to conduct Phase A/B studies. These Phase A/B studies will focus on whether the proposed hardware can be accommodated, completed, and delivered on a schedule consistent with the mission schedule given in Section 5.6. An Instrument Preliminary Design Review and Confirmation for Phase C Review will be held at the completion of Phase B; approval to proceed to Phase C/D will depend on passing this review successfully.

7.5 Implementation Procedures

Selected proposers will be notified by telephone and by letter. The letter will provide instructions concerning the steps necessary to initiate funding of their award, and to schedule a debriefing by NASA with regards to the strengths and weaknesses noted in their proposals. Non-Government awardees will receive subcontracts from JPL. It is expected that all selected PIs will attend a first meeting of the Project Science Group (see Section 7.6 below) within two weeks of selection notification.

Those proposers not selected will be notified by letter and offered a debriefing based on the strengths and weaknesses of their proposals. This debriefing may be by telephone or in person at NASA Headquarters at the discretion of the proposer; however, in the latter case, NASA funds may not be used to defray travel costs.

7.6 Formation Of Project Science Group

Subsequent to the selection of investigations by NASA through this AO, a MSL Project Science Group (PSG) will be established, composed of the PIs of the Instrument investigations selected through this AO. After instrument selection and through a competitive selection of investigations, the project anticipates the addition of Interdisciplinary Scientists and Facility Investigation Scientists to the Project Science Group. The PSG will be co-chaired by the MSL Project Scientist from the Jet Propulsion Laboratory and the MSL Program Scientist from NASA Headquarters. The PSG will meet regularly through the lifetime of the MSL Mission with a charter to work with the Mars Exploration Program Office to maximize the scientific return of this mission within the existing resources. The MSL mission science return will be further enhanced by the later addition of Participating Scientists near MSL launch.

8.0 SCHEDULE

The following schedule applies to this Announcement of Opportunity:

FBO release.....	April 2004
AO release.....	April 14, 2004
Preproposal Conference	May 4, 2004
Notice of Intent due by 4:30 p.m. ET.....	May 14, 2004
Proposal due by 4:30 p.m. ET.....	July 15, 2004
Non-U.S. Letters of Endorsement due	Proposal Due
Selections announced (target)	Proposal Due + 4 months
Instrument Phase A/B start.....	Selection + 2 weeks

Proposals are to be delivered to the address given in Section 6.6 above. Note that proposals received after the deadline indicated above will be handled in accordance with the policy for late proposals as given in Section VII of Appendix A.

9.0 CONCLUSION

MSL will assess the potential for habitability (past and present) of a carefully selected landing region on Mars by exploring for the chemical building blocks of life and seeking to understand quantitatively the chemical and physical environment with which these components have interacted over the geologic history of the planet. Thus, MSL will advance substantially our understanding of the history of Mars and, potentially, its capacity to sustain life. NASA's Office of Space Science invites the entire scientific community, including international scientists, to participate in this important and exciting mission.

Orlando Figueroa
Director
Solar System exploration Division
Mars Exploration Program

Edward J. Weiler
Associate Administrator for
Space Science

APPENDIX A

GENERAL INSTRUCTIONS AND PROVISIONS

I. INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a proposal, the investigator and institution agree that NASA has the option to accept all or part of the offeror's plan to provide the instrumentation or ground support equipment required for the investigation or NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use, by the selected investigator, of Government instrumentation or property that becomes available, with or without modification, that will meet the investigative objectives.

NOTICE TO ALL OFFERORS: NASA, through its FFRDC, JPL, will award subcontracts to non-Government participants, including Co-Investigators, hardware fabricators, and service providers who are named members of the proposing team, as long as the selecting official specifically designates the participant(s) in the selection decision. These subcontracts will require submission of proposal data to JPL as discussed in Appendix B, Part 4, Paragraph 2.7.7. This proposal information will be reviewed by the JPL subcontracting official as the basis for negotiating and awarding a subcontract.

II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal, the investigator and the organization agree that NASA has the option to make a tentative selection pending a successful feasibility or definition effort. NASA has the option to contract in phases for a proposed experiment and to discontinue the investigative effort at the completion of any phase. The investigator should also understand that NASA may desire to select only a portion of the proposed investigation and/or that NASA may desire the individual's participation with other investigators in a joint investigation, in which case the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a selection. Where participation with other investigators as a team is agreed to, one of the team members will normally be designated as its team leader or contact point.

III. SELECTION WITHOUT DISCUSSION

The Government reserves the right to reject any or all proposals received in response to this AO when such action shall be considered in the best interest of the Government. Notice is also given of the possibility that any selection may be made without discussion (other than discussions conducted for the purpose of minor clarification). It is, therefore, emphasized that all proposals must be submitted initially on the most favorable terms that the offeror can submit.

IV. NON-U.S. PROPOSALS

The guidelines for proposals originating outside of the United States are the same as those for proposals originating within the United States, except that the additional conditions described in Section 5.11 and Appendix B, Section 2.7.4 through 2.7.6 of the AO shall also apply.

V. TREATMENT OF PROPOSAL DATA

It is NASA policy to use information contained in proposals and quotations for evaluation purposes only. While this policy does not require that the proposal or quotation bear a restrictive notice, offerors or quoters should place the following notice on the title page of the proposal or quotation and specify the information subject to the notice by inserting appropriate identification, such as page numbers, in the notice. Information (data) contained in proposals and quotations will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice. To prevent inadvertent disclosure, proposal data shall not be included in submissions (e.g., final reports) that are routinely released to the public.

Restriction On Use and Disclosure of Proposal and Quotation Information (Data):

The information (data) contained in (insert page numbers or other identification) of this proposal or quotation constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed for other than evaluation purposes; provided, however, that in the event a contract is awarded on the basis of this proposal or quotation, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract. This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

VI. STATUS OF COST PROPOSALS

The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes, and that, following selection and during negotiations leading to a definitive contract, the institution may be required to resubmit or execute all certifications and representations required by law and regulation.

VII. LATE PROPOSALS

The Government reserves the right to consider proposals or modifications thereof received after the date indicated for such purpose, if the selecting official deems it to offer NASA a significant technical advantage or cost reduction, as compared with proposals previously received (see NFS 1815.208).

VIII. SOURCE OF SPACE INVESTIGATIONS

Investigators are advised that candidate investigations for space missions can come from many sources. These sources include those selected through the AO, those generated by NASA in-house research and development, and those derived from contracts and other agreements between NASA and external entities.

IX. DISCLOSURE OF PROPOSALS OUTSIDE GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desires to preclude NASA from using an outside evaluation, the investigator or institution must so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

X. EQUAL OPPORTUNITY

For any NASA contract resulting from this solicitation, the clause at FAR 52.222-26, "Equal Opportunity," shall apply.

XI. PATENT RIGHTS

- A. For any contract resulting from this solicitation awarded to other than a small business firm or nonprofit organization, the clause at 1852.227-70, New Technology, shall apply. Such contractors may, in advance of a contract,

request waiver of rights as set forth in the provision at 1852.227-71, Requests for Waiver of Rights to Inventions.

- B. For any contract resulting from this solicitation awarded to a small business firm or nonprofit organization, the clause at FAR 52.227-11, Patent Rights—Retention by the Contractor (Short Form) (as modified by 1852.227-11), shall apply.

XII. RIGHTS IN DATA

Any contract resulting from this solicitation will contain the Rights in Data – General Clause: FAR 52.227-14.

XIII. SMALL AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING

A. Offerors are advised that, in keeping with Congressionally mandated goals, NASA seeks to place a fair portion of its contract dollars, where feasible, with small, small disadvantaged, women-owned small business concerns, and Historically Black Colleges and Universities (HBCUs), and other minority educational institutions, as these entities are defined in FAR 52.219-8 and 52.226-2.

B. Section 8(d) of the Small Business Act requires insertion of the clause at FAR 52.219-9, Small Business Subcontracting Plan, in NASA contracts that offer subcontracting possibilities, exceed \$500,000, and are with organizations other than small Business Concerns. Offerors seeking Phase A/B contracts that meet these criteria must include subcontracting plans as part of their proposals for this phase. The subcontracting plans will be evaluated on the participation goals and quality and level of work performed by small business concerns, HBCUs, and other minority educational institutions. Offerors will also be evaluated on proposed participation targets of small business concerns (SDBs) in the applicable North American Industry Classification System (NAICS) Subsector as determined by the Department of Commerce (see FAR 19.201(b)).

C. Offerors that are selected for Phase A/B contracts will be required to submit new subcontracting plans in conjunction with their continuation into Phase C/D. These plans will reflect subcontracting opportunities anticipated as part of the Implementation Phase contracts. The subcontracting plans and the participation of SDBs in the performance of this phase of the contract will be evaluated in the manner described in Paragraph B above as part of the process of selecting the Implementation Phase contractor.

XIV. WITHDRAWAL OF PROPOSALS

Proposals may be withdrawn by the proposer at any time before award. Proposers are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances, which dictate termination of evaluation.

APPENDIX B

GUIDELINES FOR PROPOSAL PREPARATION AND SUBMISSION

1.0 General Guidelines

The following guidelines apply to the preparation of proposals by investigators in response to this AO. The material presented is a guide only and it is not intended to be all encompassing. The proposer should provide information relative to those items that are applicable or as otherwise required by this AO.

In order to provide a firm basis for the uniform evaluation of proposals received in response to this AO, the information concerning the Mars Science Laboratory (MSL) capabilities and constraints, the expected flight environments, the ground system capabilities and constraints, and the requirements for data archiving, as described in the MSL Proposal Information Package (PIP) must be used for proposal preparation (for information on accessing the PIP, see Section 3.0 of this AO).

The proposal must consist of only one bound volume with readily identified sections. All documents must be typewritten in English, use metric units, and be clearly legible. Proposals must be printed on 8.5 x 11 inches or A4 European standard stock. Proposals may contain foldouts up to 11 x 17 inches (or European equivalent), but such foldouts count as two pages each, or four pages if printed on both sides, against the page limits (see Tables 1 and 6 below). Proposals may not reference a World Wide Web site for any data or material needed to understand or evaluate the proposal, nor may any additional material be submitted by any type of electronic medium such as audio tape, videotape, floppy disk, CD, etc. unless otherwise requested in this AO.

Single- or double-column format is acceptable. In complying with the page limit, no page is to contain more than 55 lines of text, the margins all around must be one inch wide or wider, and the type font must not be smaller than 12-point (i.e., must have ≤ 15 characters per inch). Figure captions must be in 12-point font although text in the figures and in cost tables may contain smaller font as long as they are easily legible.

In order to allow for recycling of proposals, all proposals and copies must be submitted on plain white paper only (e.g., no cardboard stock or plastic covers, no colored paper, etc.). Photographs and color figures are permitted if printed on recyclable white paper. The signed original proposal (including cover page, certifications, and non-U.S. endorsements) must be bound in a manner that makes it easy to disassemble for reproduction. Except for the original, two-sided copies are preferred. Every side upon which printing appears will be counted against the page limits. The other copies for review must be stapled but not otherwise bound. For each paper copy, one searchable, PDF-formatted, exact duplicate of the proposal, must be provided on Compact Disc-Read Only Memory (CD-ROM).

In all proposals, a science investigation must be clearly defined. The description of any proposed instrumentation must provide adequate technical information to permit evaluation of both the concept and the practical feasibility of the investigation in terms of the MSL spacecraft resources, configurations, or special requirements necessary for successful implementation. The proposal should also contain the best possible description of the proposer's plans for data processing, management, and archiving. Many of the details of the MSL program data management procedures are not established at this time, but the proposal should include as much information as possible concerning the investigator's plans, requirements, and costs, especially those for unique data management requirements (hardware and software).

2.0 Contents of Proposals for Investigations Providing Flight Instrumentation

Each proposal must be submitted as a single bound document that contains, in addition to the cover page, table of contents, and Fact Sheets, four parts as indicated in Table 1:

1. Part 1: Science Investigation and Science Implementation;
2. Part 2: Management, Schedule, and Cost;
3. Part 3: Plans for Education/Public Outreach, and Small Disadvantaged Business and Minority Education Institution; and
4. Part 4: Appendices.

Proposers wishing to be evaluated and considered as both an Instrument Proposal and as a Suite Proposal must submit completely separate proposals for each consideration.

Table 1. Page Limits for Investigations Providing Flight Instrumentation

Section of Proposal	Page Limit
Cover Page/Investigation Summary	Printed from web site http://proposals.hq.nasa.gov/proposals/cfm
Table of Contents	No limit
Proposal Summary Fact Sheet	2 pp.*
Part 1: Science Investigation and Science Implementation	25 pp.*
Part 2: Management, Schedule, and Cost	25 pp.
Part 3: E/PO, and Sm. Disad. Business/Minority Educational Institutions Plans	E/PO: 4 pp text. + budget + 1pp for SDB/MEI commitments.
Part 4: <u>Appendices</u> (no others permitted) 1. Cost and budget tables and supporting data 2. Resumes (2 pages maximum each) 3. Statements of Commitment from Co-I's 4. Letters of Endorsement for Non-Code S Organizations (including foreign entities) 5. Draft International Participation Plan-	No page limits but minimum size encouraged.

Discussion on Compliance with U.S. Export Laws and Regulations 6. Outline of Technical Responsibilities between U.S. and international partners 7. Cost and Pricing Data and Documentation for Phase A/B Contract 8. Contractual Statement(s) of Work 9. Instrument Accommodation Requirements Summary 10. NASA PI Hardware Selection Process (as appropriate) 11. References (as appropriate) 12. Abbreviations and Acronyms	
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* The page limits for the Instrument Summary Fact Sheet and Part I are respectively increased to 4 pp. and 50 pp. if the proposal is for a suite of instruments.

2.1 Cover Page/Investigation Summary

A *Cover Page/Proposal Summary* is an integral part of the proposal and is generated by accessing the Web site located at <http://proposals.hq.nasa.gov/proposal.cfm> and filling in the requested information. It is then both printed out in hard copy for submission with the proposal, as well as submitted electronically to that Web site. The *Cover Page* form requires the full names of the Principal Investigator (PI) and the authorizing institutional official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, as well as the names, institutions, and E-mail addresses of all participants, and the total NASA Office of Space Science (OSS) Cost. The *Proposal Summary* form provides the equivalent of about one-half page of space for a brief description of the intended science investigation, as well as a brief statement of the objectives for Education/Public Outreach. Note that NASA enters the Summaries of all investigations selected for its various programs into a publicly accessible database. Therefore, the *Proposal Summary* should not contain any proprietary or confidential information that the submitter wishes to protect from public disclosure.

Proposers must not reformat this *Cover Page/Proposal Summary* after it is printed, since the information thereon is automatically entered into NASA's main database for the proposal. This form may be accessed for editing of submitted material up to the time of the proposal submission deadline by following the instructions at this Web site. Proposers without access to the Web or who experience difficulty in using this site may contact the Help Desk by E-mail at dtripp@hq.nasa.gov for assistance. Finally, note that submission of the electronic *Cover Page/Proposal Summary* does not satisfy the deadline for proposal submission.

The printed copy of this *Cover Page* that is submitted with the proposal must be signed by the PI and the official of the investigator's organization who is authorized to commit the organization to the completion of the investigation should it be selected. This

authorizing signature now also certifies that the proposing institution has read and is in compliance with the three required certifications discussed in Section 7 and shown in Appendix E; therefore, these certifications do not need to be submitted separately.

2.2 Table of Contents

The proposal must contain a Table of Contents that parallels the outline provided below in Sections 2.3 through 2.7.

2.3 Investigation Summary Fact Sheet

An Investigation Summary Fact Sheet must be included in the proposal that provides a brief description, including a table listing the major instrument parameters or specifications, of the proposed investigation. The information conveyed on this Fact Sheet should include the following: science objectives, schematic description of the proposed instrumentation (including figures or drawings at the proposer's discretion), objectives for Education/Public Outreach and new technology, operations overview (including how science operations fit with major mission characteristics), instrument project management overview (including teaming arrangement as known), schedule, and cost estimate. This Fact Sheet is restricted to two pages (preferably a double-sided single sheet).

2.4 Part 1: Science Investigation and Science Implementation

Part 1 of the proposal must address two specific things: the proposed science investigation; and the proposed science implementation. The proposal should contain enough background information to be meaningful to a reviewer who is generally familiar with the field, although not necessarily a specialist. The main body of Part 1 will generally contain the following:

2.4.1 SCIENCE INVESTIGATION.

In this section of Part 1, provide an overview of the investigation being proposed. In addition, address the need for this investigation, trace the science goals and objectives to the investigation requirements and implementation. This section must also be responsive to the evaluation criteria for Scientific Merit as described in Section 7.1 of this AO.

2.4.1.1 Scientific Goals and Objectives. This section must discuss the goals and objectives of the investigation; their value to one or more of the science objectives and investigations of the MSL mission and the overall objectives of the Mars program in general; and their relationships to past, present, and future investigations and missions. It must provide a full description of the concept of the proposed investigation and the method and procedures for

carrying out the investigation, including such factors as its relationship to past and any current or future efforts.

2.4.1.2 Science Requirements. This part of the section should indicate in detail the kinds of measurements to be made during the mission that will be needed to carry out the proposed investigation objectives, the experiment concept for obtaining these data, and how these data would be analyzed once obtained (for example, comparison with current data or models, the production of geological maps, etc.). The scientific requirements for the investigation must be explicitly defined and be linked to the science objectives of the MSL mission. The relationship between the data products generated and the scientific objectives of the proposed investigation must be explicitly described. The quality of the data to be returned (resolution, coverage, pointing accuracy, measurement precision, etc.) and the quantity of data (bits, images, etc.) should be clearly defined, justified, and linked quantitatively to the measurement objectives. The improvement over current knowledge that the results of the investigation are expected to provide must be clearly stated. As appropriate, the proposal should indicate how the investigation relates to other mission investigations as solicited in this AO, and the specific approach being taken to coordinate measurement goals and/or to share instrument hardware.

2.4.2 SCIENCE IMPLEMENTATION

In this section of Part 1, provide a full description of the experiment hardware and software proposed to be supplied that will produce the data necessary to complete the activities described in the Investigation, including all information necessary to plan for its design, development, integration, test, ground operations, and flight operations. The proposal must describe the technical approach for every element of the investigation to ensure that the investigation's requirements do not exceed available accommodation and/or financial resources. This section of Part 1 must be responsive to the evaluation criteria of Science Feasibility, as well as some parts of the evaluation criteria for Implementation Risk as discussed in Section 7.1 of the AO. This section must be complete without the need for additional information for its full understanding, however, references to data or information in other Parts or Sections is acceptable to avoid redundancy.

2.4.2.1. Payload Instrumentation Description. Fully describe the proposed flight instrumentation, including any associated mechanisms, deployments and/or pointing devices. Performance requirements should be directly related to the stated investigation objectives. Strategies for any type of data compression that may be implemented should be discussed clearly. The proposal should describe any technology developments that are anticipated for development of the instrument, and also describe backup strategies in the event that the expected technologies do not become

available. The proposal should also describe any recognized need for supporting laboratory research or ground-based, airborne, or other activities required to support development of the instrument and/or its operation during the mission.

The proposal must outline hardware or software items proposed for development, as well as any existing instrumentation or design/flight heritage to be used. The heritage of various components of the instrument suite, supporting systems, and software must be clearly described. Note that, for any level of heritage claimed, cost information about the referenced sources of heritage will also be required in the section on cost-estimating methodology.

As a minimum, preliminary description of the instrument/suite design with a block diagram showing the components, subsystems, and their interfaces must be included. In the case of a new or not-yet-space-qualified design, the instrument/suite component or system must, to the extent possible, be compared based on performance, complexity, and cost to existing instruments.

The proposal shall provide a fabrication, test, and calibration concept by describing a fabrication plan, a test and verification plan, and a calibration plan at the instrument suite and component level. The proposal shall address any impacts in order to produce the required flight hardware and software, including but not limited to, the areas of facilities, work force, schedule, manufacturability, validation, and verification. Instrument/suite component testing and calibration during flight must also be described. The proposal shall include a flow diagram indicating order of assembly and tests. The description of the test concept shall include a verification matrix that describes the tests that are to be performed on components, development units, and subassemblies.

2.4.2.2. Payload/Instrument Integration. The proposal must describe all parameters of the instrumentation that are pertinent to its accommodation within the resources and configuration of the Rover, as described in this AO and the PIP. This information must be given in sufficient detail to permit an evaluation of both the concept and the feasibility of the instrumentation. These resources include, but are not limited to, volumetric envelope, mass, power, thermal limits, telemetry and command requirements, environmental sensitivities (*e.g.*, to electromagnetic fields, gaseous effluences, organic contamination, *etc.*); any special integration constraints; pointing requirements; and onboard data processing. Mass, power, and data processing budgets should be provided. The power discussion must outline average and peak usage, and provide a time profile

of the power needs consistent with each of the sol templates described in the PIP.

The instrument/suite component level reserves for resources such as mass, telemetry, and power must be identified. Discuss the allocation of reserves and margin to the instrument and/or suite. By way of definition, contingency (or reserve), when added to the current best estimate of the resource, results in the maximum expected value for that resource. Percent contingency/reserve is the value of the contingency/reserve divided by the value of the resource less the contingency/reserve.

Example: A suite has an allowable maximum expected value of 40 kg that includes 5 kg of reserve. The percent reserve is 5 kg divided by 35 kg (40 minus 5) or 14%.

This section must include an illustration with key dimensions of the proposed instrument and any ancillary hardware that would be integrated onto the Rover or spacecraft. Additional descriptions of accommodation details are described in the PIP.

Since the instrument locations and the interface approaches are not finalized, proposers must identify possible electrical, mechanical, and data interfaces based on information provided in the PIP. In addition, the preferred location of the instrument/suite component itself on the Rover must be described. Where more than one choice is available, proposers must identify and justify their preference. Proposals must include a discussion of the requirements of the instrument/suite component data rate (peak and average), field of view, resolution, sensitivity, pointing accuracy, average data volume per Sol, etc. A summary of the investigation's accommodation requirements must be provided per Table 6 in Part 4 Appendix 9, Instrument Accommodation Requirements Summary. Explicit guidelines for providing these requirements can be found in the PIP.

2.4.2.3 Ground Operations. Describe all requirements for pre- and post-launch ground operations support, science site implementation, and configuration control. Include an estimate of the cost of developing and maintaining a science operations facility at the Principal Investigator's home institution including any GSE/SE (see Section 5.8 of this AO).

2.4.2.4 Flight Operations. Describe all requirements for flight operations support, including instrument testing, calibration, and mission planning, including any special communications or near real-time ground support requirements, and indicate any special equipment or skills required of ground personnel.

2.4.2.5 Data Reduction and Validation. Discuss the data reduction and validation plan, including a definition of archival data products and, insofar as possible, the method of their production and expected format. Include an estimate of the cost of (ground) processor capabilities required for data reduction, validation, analysis, and archiving. The data plan should include discussion of the volume and timing of data for early release, a schedule for the submission of validated archival products to the Planetary Data System (PDS), and the plan for submission of final interpretive papers to the peer-reviewed literature, with an estimate of the costs for these activities (see Section 5.9 of this AO and Appendix E of the PIP).

2.4.2.6 Roles and Responsibilities. Describe specific roles and responsibilities of the PI and of each Co-Investigator, along with a time-phasing of their activities. Every named participant must have an identified, specific function that makes a demonstrable contribution to the development and/or implementation of the investigation. A condensed description of all prospective participants' relevant background, experience, and selected publications (if appropriate) should be provided (note: this requirement is not displaced by the resumes specified below in Section 2.7.2 of this appendix).

2.5 Part 2: Management, Schedule, and Cost

This Part of the proposal contains at least 3 sections (Management, Schedule, and Cost) and sets forth the investigator's approach for implementing the investigation. It should, in particular, provide a discussion with regards to managing the work, the recognition of essential management functions, and the overall integration of these functions in order to meet the established review and delivery dates while controlling costs. When necessary or to avoid duplication, references can be made to other parts, sections, charts, and information.

2.5.1 Management

This section should provide insight into the organization proposed for implementing the investigation, including the distribution of the work, the internal operations and lines of authority with delegations, together with internal interfaces and relationships with NASA, major subcontractors, and associated investigators.

2.5.1.1 Work Breakdown Structure. A Work Breakdown Structure (WBS) shall be defined in this part of the proposal that clearly links the investigation organization with the cost information in the cost plan (see Section 2.5.3.1 of this AO). At a minimum, the elements of the proposed WBS should include the following that also need to be reflected in the Total Investigation Cost Funding Profile (see Section 2.7, Tables 2, 3 and 4):

- 1.0 Management
 - 1.1 Management Staff
 - 1.2 Travel
 - 1.3 Reviews
 - 1.4 Mission Assurance
 - 1.5 Science Investigations
 - 1.5.1 PI Support
 - 1.5.2 Co-I #1
 - 1.5.3 Co-I #2
 - 1.5.4 Co-I #3
 - 1.6 Reserves
- 2.0 Systems Engineering
- 3.0 Development
 - 3.1 Design and Fabrication
 - 3.1.1 Inst. Subsystem #1
 - 3.1.2 Inst. Subsystem #2
 - 3.1.3 Inst. Subsystem #3
 - 3.2 Integration and Test
 - 3.2.1 Instrument Assembly
 - 3.2.2 Functional Test
 - 3.2.3 Environmental Test
 - 3.2.4 Calibration
- 4.0 Post Delivery Support
 - 4.1 Engineering Model Integration and Test Support
 - 4.2 Flight Model Integration and Test (ATLO) Support
- 5.0 Education and Public Outreach
- 6.0 Mission Operations and Data Analysis
 - 6.1 Mission Operations Development
 - 6.2 Mission Operations Support
 - 6.3 Science Data Analysis
- 7.0 Science Data Processing
 - 7.1 Computers, Data Communications and SA Support
 - 7.2 Algorithms and Software: flight and ground

Additional subelements and breakdowns to better describe the proposed investigation may be added at the discretion of the proposer.

2.5.1.2 Implementation Approach. This section should summarize the investigator's proposed implementation approach for the complete investigation, by discussing the management organization (which should be illustrated with an organization chart), the decision-making process, and the teaming arrangements. The responsibilities of team members, including contributors and institutional commitments should be discussed. Unique capabilities that each team member organization brings to the team, as well as previous experience with similar systems and equipment, should be addressed. U.S. investigations that include

cooperative arrangements with international partners must be structured on a no exchange of funds basis (see Section 5.11).

2.5.1.3 Roles and Responsibilities. The specific roles and responsibilities of the PI and Instrument Project Manager (IPM) must be described. If key project personnel (e.g., the IPM, Systems Engineer, E/PO lead, etc.) are identified, their experience and qualifications should be cited here and/or in their resumes. Risk management and risk mitigation plans must be described including the top three to five risks, descoping strategies, if relevant, and management strategies for control, allocation and release of technical, cost, and schedule reserves. When significant subcontracts are required, the acquisition strategy, including the anticipated date and length of the subcontract, and the use of performance or other incentives, should be described.

2.5.1.4 Licenses or Exemptions. The transfer of technical data or hardware to foreign parties may require export licenses or exemptions. In some cases, Technical Assistance Agreements may be needed by U.S. entities to work with foreign partners. The proposal should outline plans to meet these requirements, where applicable.

2.5.1.5 Method of Instrument/Payload Acquisition. Describe the proposed method of instrument acquisition including the following, as applicable:

- (i) Rationale for the investigator to obtain the payload instrument through or by the investigator's institution;
- (ii) Method and basis for the selection of the proposed payload instrument fabricator;
- (iii) Unique or proprietary capabilities of the payload instrument fabricator that are not available from any other source;
- (iv) Contributions or characteristics of the proposed fabricator's payload instrument that make it an inseparable part of the investigation;
- (v) Availability of supporting personnel in the institution to successfully administer the payload instrument contract and technically monitor the fabrication;
- (vi) Status of development of the payload instrument, e.g., what additional development is needed, areas that need further design or in which unknowns are present, and backup options for any function or hardware requiring technology development;
- (vii) Method(s) by which it is proposed to:
 - (a) Prepare payload instrument hardware and software specifications;
 - (b) Review development progress and maintain configuration control;
 - (c) Review design and fabrication changes;
 - (d) Participate in testing program;
 - (e) Participate in final checkout and calibration;
 - (f) Provide for integration of instrument/payload;

- (g) Support the flight operations;
 - (h) Coordinate with Co-Investigators, other related investigations, and the payload integrator;
 - (i) Assure safety, reliability, and quality; and
 - (j) Control cost.
- (viii) For proposals seeking NASA funding, describe:
- (a) Planned participation by small and/or minority business in any subcontracting for instrument fabrication or investigative support functions;
 - (b) Commitments for all major facilities, laboratory equipment, and ground-support equipment (GSE) (including those of the investigator's proposed contractors and those of NASA and other U.S. Government agencies) essential to the experiment in terms of its system and subsystems, distinguishing insofar as possible between those in existence and those that will be developed in order to execute the investigation; and
 - (c) The acquisition of new facilities and equipment with the lead time involved and the planned schedule for construction, modification, and/or acquisition of the facilities.

2.5.2 Schedules.

This section should provide a project schedule covering all phases of the investigation demonstrating how the instrument delivery dates and the MSL launch date will be met and include appropriate investigation delivery milestones. The schedule should include, as a minimum, proposed major project review dates, instrument development, instrument-to-spacecraft integration and test, mission operations, data analysis, and implementation of the E/PO program. The schedule should also show the proposed project's critical path from the beginning of Phase A to launch and should be supported by a brief explanation of the principal factors driving this schedule path. Ten weeks of funded schedule reserve against the FM delivery date should be clearly identified (also see Section 5.6 of this AO). In addition, specific tasks planned for Phase A/B should be discussed and if applicable correlated to tasks in the contractual Statements of Work (SOW) discussed in Part 4 of this appendix.

All schedules must be specific enough to show the logical and timely pursuit of the work, accompanied by a description of the investigator's work plan and deliverables to the MSL Project, and the responsibilities of the Co-Investigators. Discuss the specific roles that each of the participants and their institutions intend to play in the investigation, including a statement of the portion of time that each participant expects to devote to the investigation and of the institutional resources on which each can draw.

2.5.3 Costs

Proposers must present their estimation of the total life cycle costs for the investigation for Phases A-E. This discussion must provide sufficient depth and correlation with planned project activities to allow the reliability of these estimates to be judged. This discussion must include the basis of the cost estimates provided and a substantiation of the cost estimation methodology used. Recommended cost reserves and cost reserve management should be discussed.

2.5.3.1 Cost Plan (For Proposals Requesting NASA OSS Funding). Provide a Cost Plan in which the anticipated costs for all phases of the investigation are discussed. It should also discuss all contributions citing sources and estimated cost values. This discussion, along with required supporting cost tables and data that may be included in an Appendix to the proposal (see Part 4 of this AO) where there is no page count limit. This Cost Plan will be used to assess the realism of the proposed costs. Top-level cost considerations and rationale must be discussed, and the costs for all work should be allocated and aligned with the proposed WBS as discussed in the Management section. All costs shall be consistent with the program maximum funding levels and constraints described in Section 5.7 of this AO.

In the Cost Plan, the methodology used to estimate all costs (analogies, parametric models, past experiences, cost estimating relationships, etc.) must be discussed. Budget reserve strategy, including recommended budget reserve levels as a function of mission phase, must also be discussed. Provide all assumptions used in developing cost estimates to facilitate reviewer's understanding of proposed cost estimates, particularly with regard to Government-furnished equipment and services and full cost accounting for Civil Service Personnel. The proposal must provide cost information (in FY 2004, fixed year dollars) for any items that provide heritage to the investigation.

Where NASA-provided services are used, NASA Civil Service labor and supporting NASA center infrastructure must be costed on a full cost accounting basis. NASA field centers may submit full cost proposals based on the instructions in the NASA Financial Management Manual, Section 9091-5, *Cost Principles for Reimbursable Agreements* (see Appendix D). If any NASA costs are to be considered as contributed costs, the contributed item(s) must be separately funded by an effort complementary to the proposed investigation and the funding sources must be identified. Any non-NASA Federal Government elements of proposals must follow their agency cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

Specifically the Cost Plan should distinguish tasks and costs required for the formulation phase (Phase A/B), for the implementation phase (Phase C/D), for the operations phase (Phase E), and for investigation total life cycle.

Proposers should also submit budgets for Phase E (Mission Operations and Data Analysis) and describe their expected activities for science operations, generation, validation, archiving of data products, and data analysis activities leading to publication of the initial results of their investigations, as well as for E/PO activities (see further below) consistent with the Phase E cost guidelines given in this AO. Note that it is expected that the funding profile for the proposed E/PO activities for this mission will normally peak during the Phase E of the program. The E/PO funding guidelines of 1-2 % of a proposed PI Instrument investigation's budget refers to the mission as a whole and not each individual year. PI's will have the flexibility to work within this overall funding envelope to develop a funding profile that optimizes the output of the proposed E/PO effort. All cost data provided must be provided in the formats and tables shown in Appendix 1 of Part 4 of the Proposal.

2.5.3.2 Cost and Pricing of Phase A/B. In addition to the Cost Plan, proposers should submit cost data for Phase A/B summarized by category as enumerated below and time-phased by month. This cost data will be used to facilitate timely placement of a contract for a Selected proposal. The supporting cost tables and backup data as discussed in Section 2.7.7 of Part 4 of this appendix may be included in an appendix to the proposal where there are no page count limits; however, top-level numbers and rationale should be discussed in this section.

2.6 Part 3: Education/Public Outreach and Small Business Plans

Within a page limit of 4 for the text (see Table 1 in this Appendix) and consistent with the guidance given in Section 5.3.1 of the AO and Appendix C of the AO, discuss the plans and commitments for the following subject:

Education/Public Outreach. Describe plans for Education and Public Outreach activities of the proposed investigation, arrangements for appropriate partners and alliances, implementation of proposed activities, and dissemination of any products and materials, including a statement of intent and plans (budget and personnel) for participation in the umbrella Mars Exploration E/PO Program. See Appendix C for further guidance on the content of the E/PO section of the proposal. This section should also include the E/PO Budget Summaries given in Appendix C with a single Budget Summary form for each year of the proposed effort, a Budget Summary for the total effort and, without page limit, sufficient budget narrative to fully understand the entries and demonstrate how the budget is linked to and supports the proposed program of activities.

Small Business Plans. Within a page limit of 1 (see Table 1 in this Appendix) and consistent with the specific guidance given in Sections 5.3.2 of the AO and Paragraph XIII of Appendix A, respectively, discuss the proposed small business plan.

2.7 Part 4: Appendices

The following additional information is required to be supplied with the proposal as Appendices. They have no specific page limits but their length should be minimized. No other appendices are permitted.

2.7.1 Cost and Budget Tables and Data. All detailed cost and budget data may be contained in this appendix. The cost proposal for a contract should, for example, be included in this appendix. In addition, specific required cost data will be provided for evaluation purposes, as follows: the estimated cost of the investigation that encompasses all proposed activities, divided into two budgets, one for the development Phases A-D (up through the end of the first quarter of FY 2010; corresponding to L + 30 days) and one for the operations Phase E. The budget line items must correspond to the elements at the second level of the proposed Work Breakdown Structure (WBS) with one budget line summarizing the E/PO effort. At a minimum, to assure uniformity in submittals, the Budget Summary forms (Tables 2, 3 and 4 below) must be completed and included in the proposal. Additional budget information aligned with the proposed WBS in the format of the proposer's institution may be included without page limit, however, brevity is requested.

For budgetary costing purposes (estimation of Fiscal Year costs in Real Year Dollars), the NASA inflation index is given in the Table 5 below.

TABLE 2
TOTAL INSTRUMENT COST FUNDING PROFILE
FY Costs in Real Year Dollars (to nearest thousand), Totals in RY and Fixed Year '05 Dollars

Cost Element **	Formulation		SUBTOTAL Formulation*		Implementation			SUBTOTAL Implementation*		TOTAL LIFE CYCLE	
	FY1	FYx	RY \$	FY05\$	FY1	É	FYz	RY \$	FY05\$	RY \$	FY05\$
Start to Launch + 30 Days (Phases A/B/C/D)	Enter each cost element										
Phase A Concept Study											
Proj. Mgmt/Miss. Analysis/Sys. Eng.											
Instrument Development											
<i>Instrument A</i>											
Instrument Mgmt/Sys Eng											
Hardware/Software Development											
Integration, Assembly and Test											
Other (1)											
<i>Instrument B</i>											
Instrument Mgmt/Sys Eng											
Hardware/Software Development											
Integration, Assembly and Test											
Other (1)											
<i>Instrument C</i>											
Instrument Mgmt/Sys Eng											
Hardware/Software Development											
Integration, Assembly and Test											
Other (1)											
Instrument Suite-Level Integration, Assembly and Test											
<i>Subtotal - Instruments</i>											
Support to S/C Integration and Test											
Launch Ops (Launch +30 days)											
Science Team Support											
Pre-Launch GDS/MOS Development											
DSN/Tracking											
Other (2)											
<i>Subtotal Phases A-D before Reserves</i>											
Instrument Reserves											
Other Reserves											
Total Phases A/B/C/D											
Launch + 30 Days to End of Mission (Phase E)	Enter each cost element										
Mission Operations & Data Analysis (including Project Management)											
DSN/Tracking											
Other (2)											
<i>Subtotal Phase E before Reserves</i>											
Reserves											
Total Phase E											
Launch Services											
Total NASA Cost											
Contributions (2)											
Total Contributions											
Total Mission Cost = →											

(1) Other: list items not specific to individual instruments separately

(2) Specify each item on a separate line; include Education & Public Outreach, facilities, etc.

* Note: Formulation = Phase A + B; Implementation = Phase C + D + E; all numbers must map to Tables 3 and 4 which are summarized by phase and by WBS.

** See **Program Cost Elements** document in AO Library

TABLE 3
MISSION PHASE SUMMARY OF NASA OSS COST
FY Costs in Real Year Dollars (to nearest thousand); Totals in RY and FY 05 Dollars

Cost Element	FY1	FY2	FY3	É	FYn	TOTALS	
						RY \$	FY05 \$
Phase A Concept Study							
Additional Phase A (if required)							
Phase B							
Phase C/D							
Phase E							
Launch Vehicle/Launch Services							
Total OSS Mission Cost							
Contributions							
Total Mission Cost							

TABLE 4
PROJECT-SPECIFIC WBS SUMMARY OF NASA OSS COST
FY Costs in Real Year Dollars (to nearest thousand); Totals in RY and FY 05 Dollars

Project WBS Elements ¹	Phase A/B			Phase C/D			Phase E			TOTALS	
	FY1	FY2	Subtotal	FY _{CDI}	FY _E	Subtotal	FY _{EI}	FY _E	Subtotal	RY \$	FY05 \$
WBS 1											
1.1											
1.2											
1.n											
WBS 2											
2.1											
2.2											
2.n											
WBS 3											
3.1											
3.2											
3.n											
WBS 4											
4.1											
4.2											
4.n											
WBS N											
N.1											
N.2											
N.n											
Other											
Launch Services											
Total OSS Mission Cost											
Contributions											
Total Mission Cost											

¹ Details should be provided to the lowest level of the WBS the project is currently using; The WBS should include lower-level elements comprising each individual instrument element; all figures must still map to Table 1.

TABLE 5
NASA NEW START INFLATION INDEX

Fiscal Year	2005	2006	2007	2008	2009	2010	2011
Inflation Rate	0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Cumulative Inflation Index	1.0	1.031	1.063	1.096	1.130	1.165	1.201

2.7.2 Resumes. Resumes or curriculum vitae must be provided for each member of the Investigation's science team identified in Part 1 and for other key personnel (such as the Instrument Manager, Systems Engineer, or individuals leading the E/PO work) identified in Part 2 or 3. Each resume must clearly demonstrate experience related to the job the individual will perform on the proposed investigation. Resumes or curriculum vitae are restricted to 2 pages or less for each team member.

2.7.3 Statements of Commitment from Co-Investigators. Every Co-I and Collaborator (including E/PO personnel involved in the investigation), whether from a U.S. or a non-U.S. institution (including the PI's own institution), who is identified as a participant in the proposal must submit a brief, signed statement of commitment that acknowledges his/her participation. Multiple Co-Is and/or Collaborators may be submitted on a single statement so long as each is identified by their institution. Such statements may be a facsimile, so long as an original signature is included, or an E-mail, so long as the identity of the sender is provided as a typed signature, as well as being given by the header of the message.

"I(we) acknowledge that I(we) am(are) identified by name as Co-Investigator(s) [or Collaborator(s)] to the investigation entitled <name of proposal> that is submitted by <name of Principal Investigator> to the MSL opportunity AO, and that I(we) intend to carry out all responsibilities identified for me(us) in this proposal. I(we) understand that the extent and justification of my(our) participation as stated in this proposal will be evaluated during peer review in determining the merits of this proposal, and that, as a condition for possible selection, NASA may direct the removal of personnel from this team who are considered unwarranted for the successful completion of the proposed investigation."

2.7.4 Letters of Endorsement. Letters of endorsement must be provided from all non-Code S organizations (including foreign participants) offering goods and/or services (including the support of members of the science team) for the proposed investigation. Proposals lacking such letters, or including letters judged inadequate by NASA, may be rejected without further review. Proposals from foreign entities, and proposals from U.S. entities that include foreign participation must be on a no-exchange-of-funds basis and must be endorsed by the respective Government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such letters of endorsement must be signed by institutional and/or Government officials authorized to commit their organizations to participation in the proposed investigation. All letters of endorsement are to be included in and submitted with the proposal. Copies of faxed or E-mailed letters from non-U.S. participants may be substituted in the submitted proposals as long as original signed letters are received by the date and time specified in Section 8.0 of the AO. See Section 5.11.1 of the AO for further information on non-U.S. proposals.

2.7.5 Draft International Participation Plan - Discussion on Compliance with U.S. Export Laws and Regulations. Investigations that include international participation, either through involvement of non-U.S. nationals and/or involvement of non-U.S. entities must include a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, *et seq.* and 15 CFR 730-774, *et seq.*, as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or, if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available through Internet URLs <http://www.pmdtc.org> and <http://www.bis.doc.gov/>. Proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified, or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and, therefore, subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq.* (see Section 5.1.1).

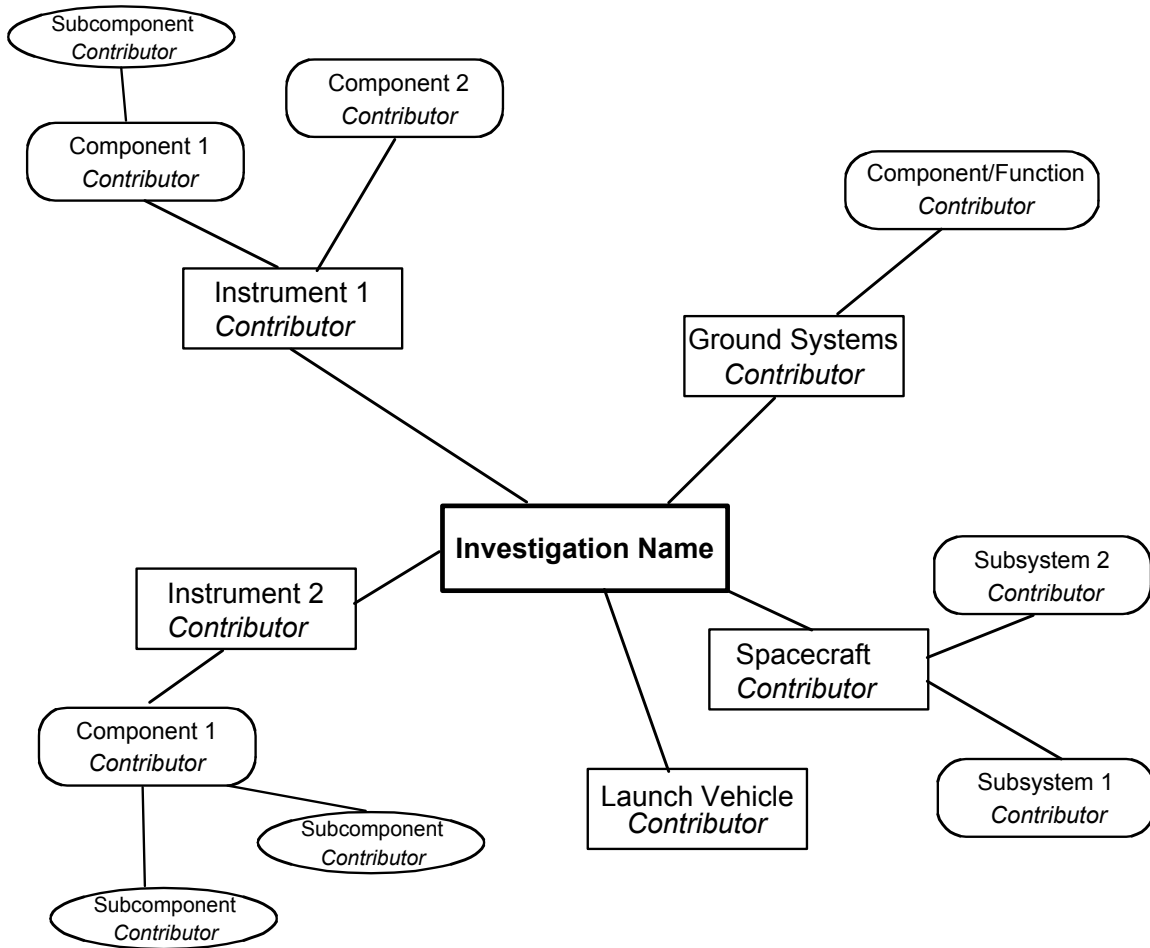
2.7.6 Summary of Proposed Program Cooperative Contributions. As provided in Section 7.1 of the AO, each proposal will be evaluated for feasibility of the proposed approach for implementation, including cost risk (see also Section 5.11). Per these provisions, proposals that include cooperative contributions, whether foreign or domestic, may be attributed risk if (1) the approach does not have clear and simple technical and management interfaces; (2) the proposal does not provide evidence that the contribution is within the scientific and technical capability of the contributing partner; and/or (3) the proposal does not include a firm commitment for each contribution. Cooperative contributions are defined to be those that are to be provided to the proposed investigation from a domestic or international partner on a no-exchange-of-funds basis. In order to aid NASA in conducting an equitable assessment of risks from cooperative contributions, each proposer must provide, in addition to the commitment letter from funding sponsors of all cooperative contributions, two additional items:

1. An "exploded diagram" of the investigation (see example figure) that provides a clear visual representation of cooperative contributions incorporated in the proposed implementation approach.

All cooperative contributions, including those that will require an international agreement, or interagency memorandum of agreement, must be shown in this diagram. Each contribution shown must display a unique name for the contribution as well as the identity of the contributing entity. However, the following need not be shown:

- i. Since this AO does not solicit proposals for spacecraft, launch vehicle, or services or ground operations or facilities, these boxes need not be shown on the diagram at all;
- ii. Scientific collaborations such as joint data analysis that do not involve contribution of flight hardware or other items critical to the investigation should not be shown;
- iii. Foreign or domestic goods and services obtained by contract using NASA funds are not cooperative contributions and are also not to be shown.

Example “exploded diagram” for a generic proposal



2. A supporting table with more information that elaborates each cooperative contribution shown in the exploded diagram.

The table must include, for each contribution, the following information:

- i. Unique name identifying the contribution (matching the name on the exploded diagram);
- ii. The identity of the providing entity, whether foreign or domestic;

- iii. For foreign contributions, the identification of the funding sponsor, if different from the entity identified in item (ii) above; and
- iv. The approximate value of the contribution, in U.S. dollars (i.e., what would be the cost to NASA to replace the contribution if it were not provided as planned).

2.7.7 JPL Required Cost and Pricing Data and Documentation for Phase A/B Contract. To facilitate contract implementation through immediate issuance of a four-month “start up” contract, proposers should deliver the following documentation in an Appendix to the proposal:

Point of Contact

Identify the contract manager/program coordinator responsible for direct interaction with the JPL Subcontract Manager.

Data Submittal

Complete the acknowledgement form found at:
<http://acquisition.jpl.nasa.gov/pdf/2384-a1.pdf> or
at:<http://acquisition.jpl.nasa.gov/pdf/2384-3-a5.pdf> (if the proposer is a university) and have it executed by the proposer’s cognizant authority.
Complete and submit the Government Property form found at:
<http://acquisition.jpl.nasa.gov/pdf/0544-a3.pdf> and the Past Performance form found at: <http://acquisition.jpl.nasa.gov/pdf/0358-a14.pdf>.

Provide a letter authorizing the release of rate and other relevant information to the Jet Propulsion Laboratory.

Phase A/B Cost Proposal.

Submit the cost information requested below for the period of Phase A/B only, summarized by cost element and time phased by month. Labor should be proposed by work hour, not work month. Provide a breakdown of all labor categories and associated hours to perform the effort defined in the Specimen Contract. This information should be submitted using the form found at <http://acquisition.jpl.nasa.gov/pdf/0549-a15.pdf> or your computer generated equivalent. A copy of the data must be provided on a CD in Excel or Excel-compatible format.

This data provides a detailed cost proposal for performing the Phase A/B activities. Detailed plans for Phase A/B should be described, but reference may be made to other sections of the Investigation proposal, as appropriate. Other guidance for developing this cost proposal is below:

Work Breakdown Structure. A Work Breakdown Structure (WBS) should be included for Phase A/B of the mission. The structure of the WBS should be consistent with the plans set forth in the Technical Approach and Management sections of the Investigations proposal and the Statement of Work provided as an Appendix 8 to the Investigation proposal.

Workforce-Staffing Plan. Provide a workforce-staffing plan that is consistent with the WBS. This workforce-staffing plan should include all team member organizations and should cover all management, technical (scientific and engineering), and support staff. The workforce-staffing plan should be phased by month. Time commitments for the PI, PM, and other key personnel should be clearly shown.

Proposal Pricing Technique. Describe the process and techniques used to develop the Phase A/B cost proposal. Provide a description of the cost-estimating model(s) and techniques used in the Phase A/B cost estimate. Discuss the heritage of the models and/or techniques applied to this estimate, including any known differences between missions contained in the model's data base and key attributes of the proposed mission. Include the assumptions used as the basis for the Phase A/B cost and identify those which are critical to cost sensitivity in the investigation. Identify any "discounts" assumed in the cost estimates for business practice initiatives or streamlined technical approaches. Describe how these have been incorporated in the cost estimate and will be managed by the investigation team.

Phase A/B Time-Phased Cost Summary. Provide a summary of the total Phase A/B costs consistent with below Cost Element Breakdown. Since Phase A/B costs also appear in Cost Tables 2-4, the Phase A/B cost summary should be developed consistent with the WBS used to develop these tables, and should include all costs to NASA along with all contributed costs (shown separately). The Phase A/B time-phased cost summary should be phased by month.

Cost Elements Breakdown and Supporting Data

To effectively evaluate the Phase A/B cost proposals, JPL requires costs and supporting evidence stating the basis for the estimated costs. The categories of cost for Phase A/B should include the following:

Direct Labor. List by labor category, with labor hours and rates for each. Provide actual salaries of all personnel, including civil service labor, and the percentage of time each individual will devote to the effort. NASA civil service labor and supporting NASA Center infrastructure must be costed on a full cost accounting basis (see paragraph 2.5.3.1 of this appendix).

Overhead. Include indirect costs that, because of their inclusion for common or joint objectives, are not readily subject to treatment as a direct cost (usually this is in the form of a percentage of the direct labor costs).

Materials. Provide the total cost of the bill of materials, including estimated cost of each major item, including lead time of critical items.

Subcontracts. List subcontracts over \$5,000, specifying the vendor and the basis for estimated costs and including any baseline or supporting studies.

Special Equipment. List special equipment with lead and/or development time, including number of units and types.

Travel. List estimated number of trips, destinations, duration, purpose, number of travelers, and anticipated dates.

E/PO. E/PO costs should be summarized here. Note that the Budget Summary forms and narrative (see Appendix C of this AO) required for E/PO activities should provide enough information for a complete understanding of those costs (also see Section 2.6 Part 3 of this Appendix B).

Other Costs. Provide all costs not covered elsewhere.

General and Administrative Expense. Include the expenses of the institution's general and executive offices and other miscellaneous expenses related to the overall business.

Contribution Costs. Contributions of any kind, whether cash or noncash (property and services), for instrument development by space organizations other than the OSS are welcome but must be shown as part of the total cost of the proposed investigation. Values for all contributions of property and services shall be established in accordance with applicable cost principles. A letter of endorsement that provides evidence that the responsible institution and/or Government officials are aware and supportive of the proposed investigation, and will pursue funding for the investigation if selected by NASA, must be submitted with the proposals for all U.S. contributions. For all contributions be sure to note the constraints of Section 5.1 of this AO. For non-U.S. contributions to proposals, also see Section 5.11 of the AO. The cost of contributed hardware should be estimated as either: (i) the cost associated with the development and production of the item if this is the first time the item has been developed and if the mission represents the primary application for which the item was developed; or (ii) the cost associated with the reproduction and modification of the item (i.e., any recurring and mission-unique costs) if this is not a first-time development. If an item is being developed primarily for an application other than the one in which it will be used in the proposed investigation, then it may be considered as falling into the second category (with the estimated cost calculated as that associated with the reproduction and modification alone).

The cost of contributed labor and services should be consistent with rates paid for similar work in the offeror's organization. The cost of contributions does not need to include funding spent before the start of the investigation (before completing a contract with NASA). The value of materials and supplies shall be reasonable and shall not exceed the fair market value of the property at the time of the contribution.

If any NASA costs are to be considered as contributed costs, the contributed item(s) must be separately funded by an effort complementary to the proposed investigation, and the funding sources must be identified and substantiated with a letter of endorsement from the provider. Other Federal Government elements of proposals must follow their agency cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

Fee. List any applicable fee for the submitting organization. Incentives on major contracts to the PI investigation are to be based, at least in part and as appropriate, on performance under the contract.

Start Up Contract

To facilitate the issuance of a small start up contract immediately after selection, the first four months of the Phase A/B cost data appendix must include all costs for the following activities:

Start-up Contract Tasks

The tasks to be costed for the start-up contract include, but are not limited to (References are to the PIP):

1. Participation at a science investigator's kick-off meeting held at JPL within 30 days following selection.
2. Preparation of investigation products for, and participation in the **Instrument Accommodation Review (IAR)** [Section 7.3.1.2]. Investigation products include:
 - (a) **Experiment Implementation Plan (EIP)** [Section 7.4.4.2]. The EIP will be due at the end of the third month following selection.
 - (b) **Safety Plan** [Section 7.4.4.3]. The Safety Plan (part of the EIP) will be due at the end of the third month following selection.
 - (c) **Instrument Functional Requirements Document (IFRD)** [Section 7.4.4.4]. The IFRD will be due at the end of the fourth month following selection.
3. Work with the MSL project team to understand instrument accommodation issues, to provide a preliminary interface approach with the MSL spacecraft, and to perform

engineering trade studies as needed to provide preliminary **Interface Control Document (ICD) inputs**.

4. Initiation of subcontracts with Co-Investigator (Co-I) institutions and industrial partners as appropriate.
5. Conduct reviews and meetings:
 - (a) **Monthly Management Reviews** (MMRs) [Section 7.3.1.1] starting at the end of the second month following selection.
 - (b) Science Team meetings to complete science requirement definitions.

As a guide for preparing cost data you may use the format found on the form at <http://acquisition.jpl.nasa.gov/pdf/0549-a15.pdf>. However, you may use your own formatting, so long as the information required is provided.

Long-Lead Procurements

Identify and provide information on the cost for each long lead purchased part of assembly. Long lead is identified as any purchased item that would impact the investigation development critical path if not purchased within four months following selection.

Exceptions to Terms and Conditions

JPL contracts include certain General Provisions. These can be found at <http://acquisition.jpl.nasa.gov/pdf/gp/Cost-ReimbursementwithoutFeeWithEducationalInstitution.pdf> (for universities), or <http://acquisition.jpl.nasa.gov/pdf/gp/Cost-TypeContract.pdf> (for other cost-type contracts). A large number of exceptions, or one or more significant exceptions to these General Provisions, may substantially delay getting on contract. You must provide a detailed explanation, including the rationale, for any exceptions your organization may take.

8. Contractual Statements of Work. For investigations managed from non-Government institutions, provide a Statement of Work to be used in a JPL subcontract with the investigator. For investigations managed from Government institutions, provide a Statement of Work as if the institution were non-Government. The Statement of Work must include general task statements for the development phase and for the operations phase of the investigation. All Statements of Work must include the following as a minimum: Scope of Work, Deliverables (including science data), and Government Responsibilities (as applicable). Statements of Work need not be more than a few pages in length. If more than one contractual arrangement between NASA and the proposing team is required, funding information must be provided that identifies how funds are to be allocated among the organizations.

9. Instrument Accommodation Requirements Summary. The MSL project has endeavored to create an Investigation accommodation environment that is flexible and fairly robust to the interface and infrastructure requirements of the investigations that respond to this AO. Wherever possible, the project has provided a range of interface options (e.g., a choice of data bus options) and locations (arm, mast, payload module and elsewhere on Rover), within the baseline project provided interfaces at each location.

In this appendix, proposers must summarize their accommodation requirements. The required information shown in Table 6 below includes but is not limited to: Instrument Mass, Total Mass, Mass by Proposed Location (Payload Module, Analytical Lab, Instrument Arm, Sample Acquisition Arm, Mast Scan Platform Mast, Other Rover Body, if Other specify location, Location Volume/envelope); provide dimensioned drawing; Instrument Power; Power- Peak Operational Standby Power - Average Operational Standby Non-operating, if applicable Power Profile provide a typical operational timeline Thermal Requirements Instrument survival temperature range Instrument operating temperature range; Specify if non-operational thermal maintenance for instrument survival may be required; Scan Platform Pointing Requirements; Output Data Volume Average Profile for typical operational timeline; Radiation sources, list material and strength Source(s) internal to instrument Source(s) required for test and calibration activities at JPL. Descriptions of any other pertinent accommodation information and/or instrument unique items may be added to this table. Appendix D of the PIP provides further guidance on how to describe and provide trade studies and cost estimates for instrument unique accommodation assumptions. Proposers may include description and trades information for any of these instrument unique accommodation approaches in their proposal appendix response to this required Instrument Accommodation Requirements Summary.

Table 6: Instrument Accommodation Requirements Summary

Item #	Description	Proposed Accommodation Requirement
1	Total Instrument Mass CBE / CBE+Proposed Reserve	
	Instrument CBE Mass, by Proposed Location	
1-a	Payload Module/Analytical Lab	
1-b	Instrument Arm	
1-c	Sample Acquisition Arm	
1-d	Mast Scan Platform	
1-e	Mast - Other	
1-f	Rover Body - Please specify location	
1-g	Other - Please specify Location	
	Volume/Envelope	
2	Please provide dimensioned drawing	PROVIDE AS ATTACHED SHEET
	Instrument Power	
3-a	Peak Operational Power	
3-b	Peak Standby Power	
3-c	Average Operational Power	
3-d	Average Standby Power	
3-e	Non-operating, if applicable (instrument unique heaters, etc)	
	Power Profile	
3-f	Typical operational timeline, including typical data collect duration(s)	PROVIDE AS ATTACHED SHEET
	Mast-mounted Pointing Requirements:	
4-a	Azimuth - Precision	
4-b	Azimuth - Repeatability	
4-c	Azimuth - Stability	
4-d	Azimuth - Timing	
4-e	Elevation - Precision	
4-f	Elevation - Repeatability	
4-g	Elevation - Stability	
4-h	Elevation - Timing	
	Thermal Requirements	
5-a	Instrument survival temperature range	
5-b	Instrument operating temperature range	
5-c	Specify if non-operational thermal maintenance for instrument survival may be required	
6	Instrument Unique Use of Flight Computer (yes/no)	
	Output Data Volume for nominal operational sequence described in proposal	
7-a	Average Data Volume generated per data collect/observation	
7-b	Profile for typical operational timeline	PROVIDE AS ATTACHED SHEET
	Lifetime Limiting Consumables	
7	List consumables & associated limits	
	Known Operating Constraints	
8	(e.g., daylight only, dark only, cold only, no sun looks, etc.)	
	Radiation sources, list material and strength	
9-a	Source(s) internal to instrument	
9-b	Source(s) required for test and calibration activities at JPL	
	Optional	
10-a	Instrument Unique Trade Studies	PROVIDE AS ATTACHED SHEETS
10-b	Other pertinent information at discretion of proposer	

10. NASA PI Hardware Selection Process (applicable only for proposals that have NASA employees as Principal Investigators). Proposals headed by NASA employees as the Principal Investigators must contain the following information concerning the process by which non-Government participants were included in the proposal: (i) indicate that the supplies or services of the proposed non-Government participant(s) are available under an existing NASA contract; (ii) make it clear that the capabilities, products, or services of these participant(s) are sufficiently unique to justify a sole source acquisition; or (iii) describe the open process that was used for selecting proposed team members. While a formal solicitation is not required, the process cited in (iii) must include at least the following competitive aspects: A notice of the opportunity to participate to potential sources; submissions from and/or discussions with potential sources; and the objective criteria for selecting team members among interested sources. The proposal must also address how the selection of the proposed team members followed the objective criteria and is reasonable from both a technical and cost standpoint. The proposal must also include a representation that the Principal Investigator has examined his/her financial interests in or concerning the proposed team members and has determined that no personal conflict of interest exists. Finally, the proposal must provide a certification by a NASA official superior to the Principal Investigator verifying the process for selecting contractors as proposed team members, including the absence of conflicts of interest.

If a proposed team member will perform a substantial portion of the science investigation, selection of the NASA PI's proposal under this AO satisfies competition requirements for the team members proposal including any hardware or routine support service to be provided by the team member. If a non-Government participant is only providing hardware or routine support services, a separate competition must take place or a noncompetitive procurement approved according to regulations.

11. References. This appendix provides a list of any reference documents used in preparing the proposal. Note that if the documents themselves are submitted with the proposal, they must be included within the prescribed page count; that is, they cannot be submitted as part of this or any other appendix.

12. Acronyms and Abbreviations. A list that defines all acronyms and abbreviations in the proposal should be included to facilitate the review and evaluation.

APPENDIX C

EDUCATION AND PUBLIC OUTREACH

1. Proposal Content

The Education and Public Outreach (E/PO) element of the proposal should provide a summary of the benefits offered by the investigation beyond the purely scientific benefits. This section of the proposal should contain a description of E/PO objectives and the planned activities to be undertaken to achieve those objectives; demonstrate how those plans will actually be implemented; discuss how the program will be evaluated; describe the intended involvement of the Principal Investigator and/or key science team members in the E/PO effort; address the involvement of educational personnel, as well as plans/commitments for partnerships and collaborations with education and outreach organizations; describe how the effort will be organized and managed (including the identification of key personnel who will be actually responsible for overseeing and implementing the E/PO effort); and explain the requested E/PO budget showing how that budget is related to and supports the planned program. Plans for developing and disseminating education/outreach products and materials, for contributing to the training of underserved and/or underutilized groups in science and technology, and for coordination of the planned E/PO program with the umbrella Mars Exploration Public Engagement program should be addressed. Details of organizational and management arrangements described in the Management and Cost Plan may be included by reference and do not have to be repeated in this section of the proposal. Letters of support/commitment from partners and resumes of key E/PO personnel should be included in the appendices to the proposal.

2. E/PO Evaluation Criteria for Principal Investigator Instrument Proposals

Based on the funding guidelines given elsewhere in this AO, the E/PO programs submitted by PI Instrument proposals in response to this Announcement may involve the expenditure of substantial resources. It is generally expected that such E/PO programs will have a breadth and depth commensurate with these resources; will be multifaceted in nature; address a number of different aspects of education and outreach contained in the specific criteria; and have state, regional, or national scope. However, the umbrella JPL Mars Exploration E/PO program is already planning and implementing a number of national efforts. Therefore, the E/PO programs associated with PI Instrument proposals may be more focused and regional in nature and will be judged accordingly. The long-range goal of having Instrument PI's (and their Teams) associated with individual Mars missions involved in E/PO is to establish a network of Mars scientists across the country who are both carrying out their own E/PO programs and acting as local agents for the Mars Program's national efforts.

The principal elements considered in evaluating an E/PO proposal are its intrinsic merit, cost, and its relevance to NASA's objectives. *The failure of a proposal to be rated highly*

in any one of these elements is sufficient cause for the E/PO proposal to be declined. Note that intrinsic merit is weighted approximately twice that of cost and relevance, which are weighted equally.

The factors that contribute to intrinsic merit, cost, and relevance to NASA objectives and indicators of alignment with these factors are presented in the “*Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria (March 2004)*” which can be found linking through “*Education*” at the Web site <http://spacescience.nasa.gov/> or in the MSL Acquisition Program Library.

Plans for coordination of the proposed activities with the umbrella Mars Exploration Public Engagement program will also be explicitly considered in the evaluation process.

In all cases, note that while creativity and innovation are certainly encouraged, neither of these sets of criteria focuses on the originality of the proposed effort. Instead, NASA seeks assurance that the proposer is personally committed to the E/PO effort and the PI and/or appropriate research team members will be actively involved in carrying out a meaningful, effective, credible, and appropriate E/PO activity; that such an activity has been thoughtfully planned and will be carefully executed; and that the proposed investment of resources will make a significant contribution toward meeting OSS E/PO plans and objectives. OSS wants to see E/PO handled just as thoroughly and professionally as are the scientific and engineering aspects of OSS missions.

To aid proposers in the preparation of their proposals, as well as to ensure that reviews are carried out on a consistent basis aligned with the OSS Education Strategy and Implementation Plan, an *Explanatory Guide* to the E/PO evaluation criteria has been prepared and may be found by linking through “*Education*” at the Web site <http://spacescience.nasa.gov/>.

3. Assistance for the Preparation of E/PO Proposals

NASA OSS has established a nation-wide Support Network of space science education/public outreach groups whose purpose is to directly aid space science investigators in identifying and developing high quality E/PO opportunities. This support network provides the coordination, background, and linkages for fostering partnerships between the space science and E/PO communities, and the services needed to establish and maintain a vital national, coordinated, long-term OSS E/PO program. Of particular interest are two elements of this network (which are also described in more detail in the OSS education/public outreach implementation plan referred to above):

- Four OSS science theme-oriented E/PO "Forums" are sponsored by NASA OSS to help orchestrate and organize in a comprehensive way the education/public outreach aspects of OSS space science missions and research programs, and provide both the space science and education communities with ready access to relevant E/PO programs and products; and

- Seven regional E/PO “Broker/Facilitators” are sponsored by NASA OSS to search out and establish high leverage opportunities, arrange alliances between educators and OSS supported scientists, and help scientists turn results from space science missions and programs into educationally appropriate activities suitable for regional and/or national dissemination

Prospective proposers are strongly encouraged to make use of these groups to help identify suitable E/PO opportunities and arrange appropriate alliances. However, while these Forums and Broker/Facilitators are commissioned by OSS to provide help, the responsibility for actually developing an E/PO program and writing the proposal is that of the proposer. Points of contact and addresses for all the E/PO Forums and Broker/Facilitators may be found at the link “*Education*” from the menu of the OSS homepage at <http://spacescience.nasa.gov/>.

4. Additional Information About the Mars Exploration Public Engagement Program.

Questions about the Mars Exploration Public Engagement program may be directed to:

Michelle Viotti

NASA Jet Propulsion Laboratory

Telephone: 818-354-8744

E-mail: Michelle.A.Viotti-100219@jpl.nasa.gov

BUDGET SUMMARY

for

EDUCATION/PUBLIC OUTREACH PROPOSAL

For (check one):

___ Total Period of Performance from (M/Y) _____ to _____
/or/

___ Year ___ of ___ from (M/Y) _____ to _____

1. Direct Labor (salaries, wages, and fringe benefits)	
2. Other Direct Costs:	
a. Subcontracts	
b. Consultants	
c. Equipment	
d. Supplies	
e. Travel	
f. Other	
3. Facilities and Administrative Costs	
4. Other Applicable Costs	
5. SUBTOTAL--Estimated Costs	

6. Less Proposed Cost Sharing (if any)	
7. Total E/PO Estimated Costs	

APPENDIX D

MSL INVESTIGATIONS PLANNING BUDGET PROFILE

Total Allocation (\$M RY)	FY'05	FY'06	FY'07	FY'08	FY'09	FY'10	FY'11	FY'12	FY'13
Phase A/B	10								
Phase C/D		28	27	15	5				
Phase E						9	17	12	12

The MSL investigations funding is subject to a wide variety of uncertainties. For planning purposes, the best estimate of the maximum available funds for all phases and years (including reserves) has been provided above. These funds will be distributed among the selected investigations/groups as described in Section 5.7 of the AO. Unused allocations in a given year will carry over to the following year. Proposers are advised to anticipate that the total funds for a given year will not be exceeded.

APPENDIX E
CERTIFICATIONS

The texts of the following required certifications are included for reference only. Submission of the signed printout of Web Cover Page (see Section 2.1 of Appendix B) certifies compliance with these certifications.

**1.0 Certification of Compliance with the NASA Regulations Pursuant to
Nondiscrimination in Federally Assisted Programs**

The (Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant ") hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1962 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognized and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign on behalf of the Applicant.

2.0 Certification Regarding Debarment, Suspension, and Other Responsibility Matters Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1265.

A. The applicant certifies that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three-year period preceding this application been convicted or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph A.(b) of this certification;
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or Local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

C. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lowered Tier Covered Transactions (Subgrants or Subcontracts)

- (a) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department of agency.
- (b) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.**

3.0 Certification Regarding Lobbying

As required by §1352 Title 31 of the U.S. Code for persons entering into a grant or cooperative agreement over \$100,000, the applicant certifies that:

- (a) No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, in connection with making of any Federal grant, the entering into of any cooperative, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;
- (b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, Member of Congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete Standard Form -- LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts), and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by §1352 Title 31 of the U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

APPENDIX F

ACRONYMS AND ABBREVIATIONS

AMMOS	Advanced Multi-Mission Operations System
AO	Announcement of Opportunity
ATLO	Assembly, Test, and Launch Operations
Cat	Categorization
CDR	Critical Design Review
CD-ROM	Compact Disk- Read Only Memory
CEQ	Council on Environmental Quality
Code S	Office of Space Science, NASA Headquarters
Co-I	Co-Investigator
COMPLEX	Committee for Planetary and Lunar Exploration
CR	Confirmation Review
CSR	Concept Study Report
DSMS	Deep Space Mission Systems
DSN	Deep Space Network
EDL	Entry, Descent, & Landing
EEE	Electrical, Electronic, and Electromechanical
ELV	Expendable Launch Vehicle
EM	Engineering Model
E/PO	Education and Public Outreach
ERD	Environmental Requirements Document
FAR	Federal Acquisition Regulation
FM	Flight Model
FMECA	Failure Modes, Effects, and Criticality Analysis
FTE	Full Time Equivalent
FY	Fiscal Year
GDS	Ground Data System
GFE	Government Furnished Equipment
GSE	Ground Support Equipment
HBCU	Historically Black Colleges and Universities
ISO	International Organization for Standards
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
LOA	Letter of Agreement
LOE	Letter of Endorsement
MEI	Minority Educational Institution
MEP	Mars Exploration Program
MEPAG	Mars Exploration Payload Analysis Group
MI	Minority Institution
MMO	Mission Management Office
MOI	Mars Orbit Insertion

MOS	Mission Operations System
MOU	Memorandum of Understanding
MPO	Mars Program Office
MRO	Mars Reconnaissance Orbiter
MSL	Mars Science Laboratory
NAIF	Navigation and Ancillary Information Facility
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Protection Act
NFS	NASA FAR Supplement
NOI	Notice of Intent
NPD	NASA Policy Directive
NPG	NASA Procedures and Guidelines
NRC	National Research Council
OSS	Office of Space Science
PDR	Preliminary Design Review
PDF	Portable Document Format
PDS	Planetary Data System
PI	Principal Investigator
PIP	Proposal Information Package
PM	Project Manager
PP	Planetary Protection
PPO	Planetary Protection Officer
RHU	Radioisotope Heating Unit
PSG	Project Science Group
PSIG	Project Science Integration Group
RPS	Radioisotope Power Supplies
RTG	Radioisotope Thermal Generator
RY	Real Year
S/C	Spacecraft
SDB	Small Disadvantaged Business
SE	Support Equipment
SIG	Standard Industrial Groups
SOPC	Science Operations and Planning Computer
SOW	Statement of Work
SPAH	Sample Preparation and Handling
SSSC	Space Science Steering Committee
TMC	Total Mission Cost
TRL	Technology Readiness Level
UHF	Ultra-High Frequency
URL	Uniform Resource Locator
WBS	Work Breakdown Structure
WOSB	Woman-Owned Small Business

APPENDIX G

PROPOSAL CHECKLIST

The following proposal checklist will be used by NASA to accomplish the compliance check on all proposals received in response to this AO.

Administrative	
1. Proposal delivered on time	§8.0
2. Proposal included copy of electronic cover page and summary	Appendix B
3. Original PI signature included	§6.6, Appendix B
4. Original authorizing official signature included	§6.4
5. Correct number of copies	§6.6
6. Meets page limits	Appendix B
7. Includes CD with every copy	§6.6
8. Meets general guidelines (one volume original easy to disassemble, no more than 5 fold out pages, one inch margins, maximum 15 characters/inch --approximately 12 pt font)	Appendix B
9. Required appendices included, and no additional appendices	Appendix B
10. Budgets submitted in required formats	Appendix B
11. Letters of endorsement from all organizations contributing critical goods and services including Co-Is, from all major participants, and from any required funding organizations	§5.1, Appendix B
12. Letters of endorsement from participating non-U.S. institutions	§5.11.1, §8.0, Appendix B
Scientific	
13. Addresses Science Goals and Objectives of MEP and specific science objectives of the MSL mission	§1.2, §2.0
14. Responsive to the MSL data archiving requirements	§5.9
15. Proposes a scientific investigation vs just an instrument or technology	§2.0, §5.2

Technical	
16. Complete investigation (Phases A-E)	§1.1, §5.6
17. Team led by a single PI	§5.1
18. Proposed budget within cost constraints and funding profile	§5.7, Appendix D
19. Contributions within contribution limit	§5.1
20. Phase A/B costs within cost limits	§5.7
21. Cost reserves proposed per AO direction	§5.7
22. Includes Contract Start required information	Appendix B
23. Includes E/PO and SDB commitments	§5.3, Appendix B